Individual Competencies of A Sustainability Manager in Driving Innovation

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Executive Summary

The United Nations' Sustainable Development Goals (SDGs) have emphasized the role of businesses in addressing global environmental and social challenges. As a result, companies are increasingly focusing on sustainability and integrating sustainable development goals into their business models. However, this transition presents complex and uncertain challenges, often referred to as wicked problems, as they involve multiple stakeholders with competing values. The complexity of sustainability challenges requires businesses to stimulate innovation and adapt their business models to be more inclusive, environmentally friendly, and innovative. In addition, managing innovation for sustainability is challenging, as it demands specific competencies and the ability to engage in broad activities by driving innovation for sustainable competitive advantage.

Previous research has made significant strides in examining competencies that are essential for leaders in addressing sustainability challenges and promoting innovation. However, there is still a lack of clarity regarding the specific competencies that leaders in companies should possess to tackle sustainability challenges and drive innovation effectively. The challenge lies in establishing a solid understanding of the relationship between sustainability competencies and their role in solving organizational sustainability issues. Consequently, the primary goal of this study is to investigate how managerial competencies can drive innovation for sustainability within organizations. By establishing this research objective, a corresponding research question was formulated.

How do individual sustainability competencies drive innovation for sustainability?

In order to address the question at hand, a comprehensive literature review was conducted to gain an understanding of the various definitions of innovation, the explored sustainability competencies, the role of leadership in sustainability innovation, and the existing arguments regarding competencies and innovation in prior studies. The insights obtained from the literature review were then used to formulate specific research questions, which guided the study's approach of utilizing semi-structured interviews to gather relevant data. Thirteen individuals representing three distinct industries were selected to participate in the interviews, sharing their experiences and perspectives on the subject matter. Following data collection, the gathered information was coded and analyzed, focusing on identifying common themes based on a similar context.

The study provides valuable insights into the fields of management and innovation by highlighting the significance of possessing diverse sustainability competencies for managers. These competencies play a crucial role in shaping the innovation capabilities of managers, thereby acting as a bridge in enhancing innovation and expanding organizational capabilities. The research identifies three distinct patterns that emerge as a result: organizational learning capabilities, collaboration capabilities, and stakeholder engagement capabilities.

Firstly, individual competencies such as system thinking, future thinking, tech competencies, and continuous learning enhance knowledge on an individual level, necessitating organizations to develop their own organizational learning capabilities to integrate and benefit from these competencies. Secondly, competencies such as emotional empathy,

embracing diversity, and interpersonal skills contribute to collaboration capabilities at the organizational level, fostering better communication, positive relationships, and innovative solutions. Lastly, competencies related to stakeholder engagement, such as integration, influencing, and practical communication, empower individuals to drive the adoption of sustainability in innovation projects, facilitating effective communication with customers and involving diverse actors in decision-making processes. These patterns are developed when managers actively engage in collaboration with both internal and external stakeholders and involve them in sustainability innovation activities on an ongoing basis.

While the study primarily explores individual competencies, the discussion highlights the significance of organizations in fostering a supportive environment and establishing routines that enable individuals to effectively utilize their competencies in driving innovation. Therefore the study also delivered a framework targeted to individual and organizational management to enhance sustainability competencies at the individual level. Managers are encouraged to engage in industry-specific training programs actively, embrace a dynamic mindset that promotes continuous learning and the adoption of emerging best practices, and possesses intrinsic motivation, where individuals are driven by personal values and a desire to contribute to a better future. Simultaneously, at the organizational level, effective communication of sustainability objectives require to be delivered. At the same time, it is crucial to implement sustainability initiatives throughout all project levels of the organization. Lastly, through the recruitment process, organizations should prioritize candidates whose competency profiles align with the organization's sustainability strategies.

Keywords:
sustainability competencies, organizational, leadership, sustainability innovation, cognitive competencies, emotional competencies, behavioral competencies, managers capabilities, organizational capabilities

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Introduction

1.1. Background

Environmental and social challenges like poverty, climate change, and economic globalization have forced private companies to shift their businesses more sustainably. In 2015, United Nations General Assembly UN-GA set up the Sustainable Development Goals (SDGs) aimed to create a framework for international and national action on sustainable development for all the member states of the United Nations UN (Chabay et al., 2018). With this core principle of global cooperation and national development, increasingly, a lot of focus also has been placed on business sustainability since companies have a crucial role in reaching these goals. It is explicitly stated in the 2030 Agenda of Sustainable Development that *"Private business activity, investment, and innovation are major drivers of productivity, inclusive economic growth, and job creation. We acknowledge the diversity of the private sector, ranging from micro-enterprises to cooperatives to multinationals. We call on all businesses to apply creativity and innovation to solving sustainable development challenges."* [1] (p. 29). These UN agenda and global challenges forced businesses to unravel and find solutions by implementing creativity and innovation, which can promote sustainable development in their organizations.

Although private companies need to innovate to transform into sustainable businesses, the process of this change is considered a wicked problem (Brnn and Brnn, 2018; Grin et al., 2011) specifically due to their complex characteristics. A sustainable business is a business that strives to contribute to the triple bottom line (social well-being, environmental health, and economy). However, sustainable issues involve various stakeholders and their competing values, while the solutions remain limited and require a long-term strategy that extends beyond lifetimes and future generations. Similarly, it is argued that an innovation that integrates the organization's social, environmental, and economic components faces far more significant challenges, demanding more integrated management thinking (Hall & Vredenburg, 2003). This complexity brings non-standard responses, which means that what worked in the past does not always work in the future. Thus, these wicked problems pose particular challenges to decision-makers that do not exist in well-structured or tame problems.

In line with this reasoning, a study has provided an understanding of the need for businesses to stimulate and reorient the innovation focus by reducing the environmental burden of these complex systems (Van Kleef & Roome, 2007). Businesses must adapt their business models to be more inclusive, environmentally friendly, and innovative in order to maintain and gain a competitive advantage. Based on research, innovation should not just create a competitive benefit for businesses but also deliver environmental advantages and societal well-being (Carayannis et al., 2017). Furthermore, it is argued that innovation more significantly influences businesses' competitive advantage when it entails creating innovative products or procedures that address critical challenges such as sustainability (Ambos & Tatarinov, 2022).

[1] https://sdgs.un.org/2030agenda

However, managing innovation for sustainability is not easy, as innovations that focus on sustainability challenges have been naturally complex and uncertain as it incorporates social issues and future generations' needs which require managers to develop system thinking (Hall & Vredenburg, 2003). Adding to this finding, it is found that top managers' ability to engage in various cognitive activities has been proposed as a critical factor influencing how firms make strategic changes and adapt to dynamic environments, including innovation for sustainability challenges (Adner & Helfat, 2003).

With this high complexity, sustainability challenges will need strategic and operational decisions taken either at the individual level of internal or external such as multiple stakeholders (Wesselink et al., 2015). Moreover, managing complicated, ever-changing issues and difficulties in innovating in specific topics, such as sustainability, will require extraordinary leadership (Boiral et al., 2009; Boiral et al., 2014) with specific competencies (Lans et al., 2014). Besides, it is claimed that for a company to innovate in sustainability, it needs to have several key attributes, such as the knowledge and ability to increase revenue and lower risk, the creative ability to reposition through clean technology, the vision to create a shared future road map, and communication with a variety of stakeholders (Hart & Milstein, 2003). In this context, managers are crucial to help in innovating business performance by generating ideas and by using them as building blocks for new and better products, services, and work processes. To sum up, sustainability challenges are complex issues requiring organizations with individuals who own specific competencies to support them in innovating to achieve sustainable competitive advantage.

As stated, the process of firms handling sustainability challenges is often managed by an individual, a selected group, or a sustainability professional. There is strong evidence that the number of sustainability and environmental roles in Europe is increasing (Eurostat, 2022), due to this expansion, a new professional function has emerged in the middle tier of organizations. These professionals, called sustainability leaders or managers, are accountable for the overall coherence and efficiency of the sustainability transition in their company. The role of sustainability leader is defined as an individual who strives to integrate a company's capital allocation, product development, brand, and sourcing decisions with the concepts of sustainable development (Global Association of Corporate Sustainability Officers, 2013). Furthermore, individual managers are demanded to understand the issues they face and the potential they represent within their businesses to think and act differently in response to sustainability (Hahn & Aragn-Correa, 2015). These facts explain the individual level's importance in building innovation that focuses on managing sustainability challenges.

It is discussed that sustainability competencies have been discovered to be critical for innovation and creativity (Van Kleef & Roome, 2007). Competence related to sustainability combines an individual's knowledge, abilities, and attitudes, enabling them to do certain activities and achieve specified goals suited to the context in terms of real-world sustainability concerns, challenges, and opportunities (Wiek et al., 2011). Employee capabilities, combined in teams and linked through structures and routines, are the building blocks of competence. Competence includes employee involvement and commitment to working and communicating across organizational boundaries that deliver value to customers and other stakeholders. Although it is clear that the competencies of sustainability managers are influential in driving innovation for sustainability, there has been scant research on how sustainability competencies can drive innovation specifically for sustainability in organizations.

Sustainability must be an essential item on the corporate agenda. At the same time, it remains difficult for leaders in companies to identify which competencies should be owned to support them in performing such innovations to solve sustainability challenges in their organizations, as the link between sustainability competencies and innovation is still unclear. Organizations might also question which critical competencies should be assessed to recruit new individuals who will perform and foster innovation in sustainability tasks and which of these competencies should be trained to produce individuals who will engage in innovation for sustainability.

This thesis will focus only on the sustainability competencies of executives who have explicitly recognized job functions relevant to corporate sustainability - sustainability leaders and managers. The scope is defined at the managers' level due to their significant responsibility in creating and implementing sustainability initiatives within their organizations. It is argued that leaders in sustainability are accountable for addressing a number of desirable but conflicting economic, environmental, and social outcomes at the firm and societal levels (Hahn et al., 2014). Thus, given that the sustainability managers' role is crucial for the organization in innovating to achieve sustainability goals, the primary research is scoped at this level. Furthermore, in recent years, although there has been an increase in the study focused on individual-level sustainability competencies in organizational sustainability research (Wesselink et al., 2015; Redman and Wiek, 2021; Osagie et al., 2016). However, little is known about how these competencies drive innovation in organizations and which competencies are necessary for leaders to drive innovation.

Therefore, the main objective that the research aims to fulfill is to determine *how the competencies of managers can drive innovation for sustainability in organizations*. Besides understanding the link, this main objective also aims to comprehend managers in sustainability regarding which key sustainability of competencies can drive innovation for sustainability in their organization. Furthermore, this finding will help sustainability managers to accelerate their transformation, people, organization, and the system they influence. Lastly, the result of the study is valuable for managers to develop programs of learning at the individual level about owning such sustainability competencies to drive innovation that considers social and environmental challenges in their organizations.

1.2. Research Questions

A research question is developed in order to achieve the previously described objective. The main research question must address the main objective:

How do individual sustainability competencies drive innovation for sustainability?

Some sub-research questions are defined to get all the input necessary to answer the main research question. The questions are the following:

- How is innovation for sustainability defined in the context of private corporations?
- What key sustainability competencies should sustainability managers possess to drive innovation?
- How can sustainability competencies influence managers' capabilities to innovate in sustainability?
- How do sustainability competencies fit together in a team that can bring forward innovation for sustainability in an organization?

1.3. Management of Technology Relevance

This research topic aligns well with the aim of the master thesis project from the master's program Management of Technology (MoT) to understand how businesses can use technology to develop and create products and services that improve outcomes such as customer satisfaction, corporate productivity, profitability, and competitiveness.

The research focuses on managing knowledge and innovation processes, where there are three intersecting domains - leadership, innovation, and sustainability. As it is clear that individuals or employees within organizations have a crucial role in succeeding in the technology management and innovation processes, this research gives valuable input to understand how competencies can foster sustainability innovation in their organizations. Furthermore, this research provides arguments on how leaders' competencies contribute to fostering organizational performance, specifically managing innovation for sustainability, in which the future outcome is to improve competitiveness by considering not only companies' profitability but also environmental and social factors. Lastly, the tools taught in the master's program are integrated into the discussion part and provide MoT perspectives on the problem under analysis.

1.4. Thesis Structure

The thesis will be structured as follows to ensure a comprehensive exploration of the research topic. The second chapter serves as the foundation, offering a theoretical background that supports the existence and significance of individual sustainability competencies in driving innovation for sustainability. This chapter aims to provide a solid understanding of the subject matter while also addressing the research gap. Additionally, a conceptual framework will be established to define the scope of the study, ensuring a focused and targeted research. On the third chapter, the methodology employed in this research will be detailed, particularly the qualitative research design. This will encompass the data collection process, including the chosen sample and interview strategy, as well as the subsequent data analysis procedures.

The fourth chapter represents a critical section where the study's findings will be presented. Drawing from expert interviews, this chapter will describe how individual sustainability competencies contribute to enhancing innovation within organizations. In the Chapter five, the findings will be thoroughly examined and linked to relevant previous studies, theories, and concepts, providing a solid conceptual foundation for the research. Furthermore, practical recommendations for individual and managerial improvement will be offered based on the interpreted interview findings. This section aims to provide actionable insights that organizations can apply to foster a culture of sustainability and drive innovation effectively.

Finally, the project will conclude by addressing the sub and main research questions, while also acknowledging any limitations inherent in the study. By providing a comprehensive overview of the research process, findings, and implications, the thesis aims to contribute to the existing knowledge base on individual sustainability competencies and their role in driving innovation for sustainability.

Theoretical Background

The following section describes the main findings from the reviewed literature and provides the research gap in order to appropriately explain how the research question in the previous section is formed.

Furthermore, the section will be divided into four main blocks. In the first part, innovation for sustainability will be explained to provide the concept of this innovation in a business organization. The second part will determine the competencies that need to be owned by a sustainability manager to give an understanding of which competencies should be considered in driving innovation. In the third section, the link between leadership, sustainability, and innovation will be defined. And lastly, the section will explain the link between sustainability competencies and innovation for sustainability in an organization.

2.1. Innovation for Sustainability

To be able to investigate the concept of innovation for sustainability, this section will start by providing the term sustainability in businesses. According to Barbieri et al. (2010), a company's sustainability can be defined conventionally as its ability to generate revenue to pay for production factors, replace used assets, and invest in competing. In this context, it is described that there will be no novelty or lack of innovations, whether on products or services and processes, management, or business models (Barbieri et al., 2010). The reason for this concept is that businesses undoubtedly should have their continuation indefinitely on their profitability. However, on the other hand, if business sustainability is understood as a genuine contribution to sustainable development that contributes to the economic, social, and environmental impacts, then innovations begin to take a role in restoring these three dimensions by bringing a degree of newness to the organization, the market, or the world (OECD, 2011). Therefore, in this sense, innovations should simultaneously produce novel positive economic, social, and environmental outcomes, such as more sustainable production cycles, products, and services, and even on new business management models (De et al., n.d.).

According to Hansen et al. (2009), from a business perspective, there is broad agreement that sustainability concerns present considerable prospects for innovation and related business opportunities. The study argued that the opportunities come from laws and regulations that increase the force business to innovate and the challenge itself, providing new ideas leading to new business potentials. Similarly, Islam et al. (2018) argued that there is a significant and positive relationship between innovation and sustainability, which supports the argument that for long-term success, companies must innovate, develop new products, redesign existing products, and invest in research and development. In other words, sustainability imposes a normative demand for businesses to become more environmentally and socially responsible while providing a new source of innovation and competitive advantage.

As stated before, innovation, widely acknowledged as the primary driver of industrial progress, has been one strategy organizations have employed, particularly in these uncertain times. More specifically, innovation for sustainability is defined as intentional

improvements to an organization's perspective and principles, as well as its products, processes, or practices, to produce and achieve social and environmental value in addition to financial gains (Adams et al., 2016). Similarly, Blum-Kusterer and Hussain (2001) argued that sustainability is an innovative and possibly transformative force that creates new products and processes that challenge the current status. Sustainability innovation knows many definitions, however, a similar concept of innovation in sustainability terms can be concluded, which is an alternation of the status quo in order to improve and integrate sustainability into the value chain, product or service offerings, and business model for an organization to maintain and gain sustainable competitive advantage by pursuing not only profitability but also considering the social and environmental impacts.

Adams et al. (2012) delivered a framework of three different stages of business that innovate for sustainability developed based on a systematic literature review followed by applying it to identify 38 practices (See Figure 1).

The first category is called Operational Optimization, where the firms in this stage seek to reduce the adverse effects of their business operations by conducting incremental innovation, such as minimizing the use of non-renewable materials. Overall, the businesses will do the same but better in this stage, and the resulting innovations are centered on the company: their primary goal is to cut costs or maximize profits. In the Organizational Transformation stage, businesses start to service new markets with creative, sustainable goods, and they are new entrants with business strategies based on generating value by raising people out of poverty or producing renewable energy. The innovation will also shift to delivering services, which is believed to have lower impacts, rather than creating new products. Lastly, firms in the System Building stage produce radical and disruptive changes in their businesses by thinking beyond their firms. The highlight of this stage is that companies aim to formulate a strategy to become more sustainable rather than less unsustainable. Further, companies also consider their economic activity a part of society, not distinct from it. The result suggested no empirical evidence that a company occupied the third stage, while most companies (70%) are still in the Operational Optimization stage.

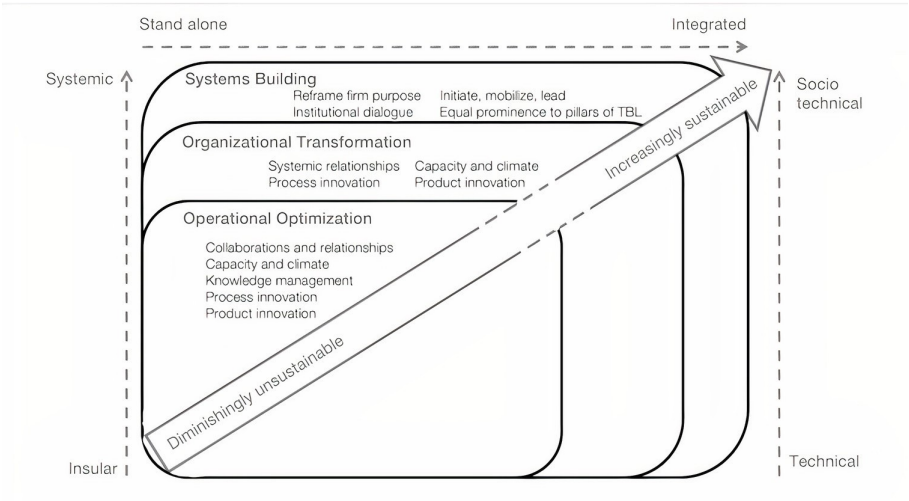


Figure 1: Three Stages of Innovation For Sustainability Framework (Adams et al., 2012)

The following section will explain the idea of innovation within the three interrelated dimensions of sustainability - economic, social, and environmental aspects.

2.1.1. Economic Innovation

Authors argued that economically sustainable businesses are defined as those that have guaranteed cash flows and consistent profitability and are primarily focused on meeting the needs of shareholders at any given time while also having a fundamental obligation to be productive and profitable (Dyllick and Hockerts, 2002; Carroll, 1979). Furthermore, a company is sustainable when it grows profits without adverse effects on the natural environment, contributing to social and environmental well-being (Souto, 2022).

Based on the literature, it is argued that environmental practices do not affect short-term profitability and sales performance; however, green innovation raises a company's costs, which has a negative impact on the company's financial performance (Bowen et al., 2006). The study found that the results of the practices clearly will not be reaped in the short term. Instead, it is suggested that enterprises prepare for higher long-term performance via better environmental risk management and the creation of capacities for continual environmental improvement. Supporting the finding, Su and Sohn (2015) proposed that companies can work on their businesses' attitudes and strategies to influence innovation effectiveness in achieving economic performance. Furthermore, companies who adopted sustainability as a mindset, rather than treating it as a cost, saw significant improvements in sustainability performance and innovation success (Metz et al., 2016).

Overall, it can be concluded that managing innovation for economic sustainability is a challenging process, as it is clear that uncertain long-term results for the organization will follow the process. Thus, businesses will be demanded to act sustainably by integrating the practices as an approach way of thinking in their organizations.

2.1.2. Social Innovation

According to Lubberink et al. (2017), the term social sustainability is used as a synonym for both intended and unintended social change, as well as intangible innovations. However, the concept of social innovation in the entrepreneurial context will be derived from Choi and Majumdar (2015), which argued that innovation expressly seeks to create social value and thus influence positive social change. As a result, in this case, the term "social" denotes that social innovation aims to address pressing social needs while improving human and environmental well-being. Similarly, Harrisson et al. (2012) argued that various aspects of social innovation had been discussed in the different streams of scholars, such as responsible innovation. Social innovation is the design and implementation of new solutions that business conceptual, process, product, or organizational change, aiming to improve the welfare and well-being of individuals and communities.

Osburg (2013) stated that there is compelling evidence that social innovation will be critical for companies to achieve corporate sustainability in the coming decade. However, several things still need to be accomplished, such as the need for sustainability managers to become change agents, integrate social innovation with corporate innovation, strategize in performing significant target audiences, and create coalitions and cross-sectoral collaborations in the businesses. Similarly, Lubberink et al. (2017) stated that companies aim to solve the knowledge gaps in innovating for social sustainability by engaging in knowledge creation within the organization (in different units of the firm by combining intra-firm knowledge) and with external actors (by joint research and development or by partnering or communicating with stakeholders). Thus, although innovation has positively impacted social sustainability, companies need to own and manage knowledge to develop this specific innovation.

2.1.3. Environmental Innovation

According to Azapagic (2003), businesses consume limited resources while producing goods and services to meet needs, causing environmental pollution by interfering with hazardous wastes, air, water, and soil that they release into the environment. Therefore, environmental innovation focuses on improving businesses' activities to minimize the negative environmental impacts. This innovation effort positively influences environmental performance improvement in organizations by reducing the consumption of solid/liquid wastes and hazardous substances, lowering the incidence of environmental accidents, and improving community health (Eltayeb et al., 2011). Similarly, Hart (1995) argued that a company's relationship with the natural environment could be formed based on three categories: pollution reduction, product stewardship, and sustainable development. From the previous studies, it is clear that environmental innovation will take place to reduce the adverse environmental impacts of business activities.

According to authors, many businesses see environmental sustainability as a cost (Metz et al., 2016; Nidumolu et al., 2009) a legal and social obligation necessitating investments that may never be recovered. However, it is argued that businesses can gain a competitive advantage by strategizing on capabilities that enable environmentally sustainable economic activity (Hart, 1995). Furthermore, the study highlighted that an external (legitimacy-based) orientation has no negative consequences on competitive advantage and may reinforce and distinguish the firm's position due to the valuable benefits of a strong reputation.

2.2. Individual Sustainability Competencies

According to Woodruffe (1993), competency is the collection of behavior patterns required for the incumbent to perform activities and duties competently. Prahalad and Hamel (2003) argued that ”distinctive competencies” are essential for organizations' competitive success, which can be achieved by identifying, managing, and leveraging ”core competencies”. The term competencies are used interchangeably with ”skills,” ”abilities,” and ”qualifications.” Competencies may be studied at many levels (organizational, team, and individual) and from various perspectives, however, this thesis will only focus on individual competencies.

Individual competencies are atomized behavioral and knowledge items extracted from specific job descriptions or can be seen as effective managers' and leaders' knowledge, abilities, and attributes (Neumann, 1979; Hornby and Thomas, 1989). Although there is a broad agreement on competency terms, a complete view of competence, on the other hand, encompasses attitudes, reasons, values, and ethics in addition to cognitive and functional characteristics such as skills and knowledge (Rieckmann, 2012; Osagie et al., 2016). Furthermore, sustainability competencies have received increased attention in the literature and have been found predominantly not only in educational journals (e.g., Redman and Wiek, 2021; Rieckmann, 2012) but also within corporate literature (e.g., Willard et al., 2010; Osagie et al., 2016; Wesselink et al., 2015). In the corporate world, sustainability competencies are described as the manager's critical skills to cope with issues, including sustainability, moral and ethical dilemmas, and stakeholder value (Dzhengiz & Niesten, 2020). These competencies help individuals translate knowledge into action in their organizations.

The following part will explain three group competencies in connection with sustainability competencies, cognitive, emotional, and behavioral competencies, based on Filipowicz (2004)'s study, which are called core competencies - competencies that are considered as

one prerequisite for creating new markets as they impact the development of a company's competitive advantage.

As stated by Rieckmann (2012), individuals' cognitive and emotional capacities, such as systems thinking and empathy, have been demonstrated to be essential for achieving sustainability goals from a competency standpoint. Furthermore, Knight and Paterson (2018) identified crucial behavioral competencies necessary to optimize leadership influence on sustainability initiatives that sustainability leaders should own – that may add and update the critical sustainability competencies. Redman and Wiek (2021) identified three new suggestions related to the competencies required by sustainable leaders to facilitate the transformations toward sustainability. From these findings, it is clear that sustainability competencies keep developing and align with the fact that the sustainability challenge is ever-changing.

2.2.1. Cognitive Competencies

A study by Rieckmann (2012) identified three fundamental competencies for higher education for comprehending the significant difficulties confronting global civilization and helping its transition toward a more sustainable future: systemic thinking and complexity management, anticipatory thinking, and critical thinking. The significant value of his research is the way he conducted empirical research by explicitly questioning international experts to target individual sustainability-related abilities. This study gave essential information into the corporate world targeted for the initial individual competencies of sustainability experts.

Following the previous study, Dentoni et al. (2012) conducted research in corporate areas and provided seven key competencies connected to three industry challenges required for professionals vigorously involved in sustainability in their work environment. Firstly, dealing with wickedness demands systems-thinking, foresighted thinking to picture the future (De Haan, 2006; Wiek et al., 2011) and normative competence to map and apply sustainability values by considering the trade-off of the available options (Wiek et al., 2011). Lastly, dealing with value creation requires action competence which needs to actively involve in improving the sustainability system (De Haan, 2006) and strategic management, which is collectively designing a project and strategizing the new business model (De Haan, 2006; Wiek et al., 2011).

2.2.2. Emotional Competencies

Besides cognitive competencies, emotional competencies in the form of managerial feeling, such as empathy, also influence sustainable development in an organization. When combined with cognitive competencies, emotional competencies effectively form superior performance through their dimensions of self-appraisal, self-regulation, motivation, empathy, and social skills. Emotional competencies enable leaders to manage their own emotions and others through self-control which can lead them to make the right business decisions (Diggins, 2004).

Furthermore, emotional competencies such as empathy, nature connectedness, and a sense of transcendence exhibit an expansive self-concept and a value for entities other than oneself, such as other humans and nature, demonstrating an interconnectedness with nature (planet) and stakeholders (people) that contributes to sustainability innovation (Nair & Bhattacharyya, 2022). A study strengthens this finding by stating that in uncertain environments, for example, sustainability challenges, emotional intelligence is essential for managers in managing a stressful situation that can help them perform innovations for their companies

(Strugar Jelaa et al., 2022). It is also argued that as sustainability challenges involve various stakeholders, the competence to embrace diversity and interdisciplinarity will be required to structure relationships and maximize the idea exchange across the groups (De Haan, 2006). It can be concluded that emotional competencies play a role in controlling both leaders' emotions and other stakeholders, which creates a pleasing environment to enhance cooperation and produce better quality in handling uncertain challenges.

2.2.3. Behavioral Competencies

Adding to the previous researchers, Knight and Paterson (2018) delivered the critical behavior competencies needed to enhance leadership impact in sustainability. Behavioral competencies are evaluated as the traits required to succeed in an organization outside of specific management or specialized skillset (Wilson et al., 2006). In other words, since sustainability leaders often work with a high level of uncertainty and unknowns, a study argued that change-oriented behavior is required to produce creative and constructive solutions to complicated organizational and social challenges (Goleman & Lueneburger, 2010). Knight and Paterson (2018) research provided crucial behavioral competencies packed into five groups: result-driven, visionary thinking, change agent, inclusive operator, and ethically oriented. In addition, interpersonal competence will also be needed to facilitate collaboration in sustainability activities in terms of delivering the change and influencing other stakeholders (De Haan, 2006; Wiek et al., 2011). These findings complemented a long-evolving list of competencies for a sustainability leader that focused not on the competencies that are intrinsic to a manager's mindset but also on behavioral competencies.

The list of competencies for sustainability leadership is undoubtedly incomplete, and there is an increasing variety of opinions articulated in the literature. Lists are helpful starting points to highlight the gaps. Furthermore, it is clear that overlap between competencies does exist. Thus, it is suggested that organizations have a mix of these individuals' competencies, although not all employees must have the whole range of competencies.

Considering the opinions from extant literature, cognitive, emotional, and behavioral sustainability competencies are crucial in driving innovation. Authors argued that each competency had given evidence of its role in organizational innovation. Firstly, according to Bonesso et al. (2020), cognitive skills appear to play a significant role in product innovation; nevertheless, managers must activate cognitive competencies with other competencies to implement this form of innovation. Secondly, emotional competencies are proven to assist companies in effectively implementing a chosen business strategy while establishing a business culture of openness and trust that encourages internal and external networking to share knowledge and ensure constant innovation (Pinos et al., 2006). Lastly, Bird (2002) argued that innovation refers to innovative behavior that stimulates cognitive processes to generate new business concepts (acquiring information, questioning; observing; experimenting with risk; networking).

To conclude, cognitive sustainability competencies are associated with the ability to think or analyze information and situations, specifically an individual's knowledge of responsible management, corporate social responsibility, and sustainability (Sharma, 2017). According to Jia et al. (2021), sustainability demands cognition and specific cognitive capacities, such as reflective capacity. Furthermore, emotional competency is the ability to analyze, comprehend, and interpret one's emotions in relation to a task or situation to perform better. Strugar Jelaa et al. (2022) argued that emotional competencies motivate the transformation of

sustainable issues by possessing empathy and sympathy to encourage others in sustaining development. While behavioral competencies include responsible skills and behaviors such as efforts for social, economic, and environmental sustainability, ethics, and transparency (Sharma, 2017).

2.3. Leadership, Innovation, and Sustainability

As it is concluded in the previous part, innovation for sustainability talks about the changes in a company's products, services, or processes designed to provide long-term social and environmental advantages while generating financial rewards for the company. This section will only focus on understanding the role of leadership in innovation for sustainability, and later in the third section, the link between sustainability competencies and innovation will be defined.

According to Cope (2003), the failure rate of organizations to deliver sustainable change at times reaches 80 to 90%. This finding leads to the fact that not all organizations are able to perform sustainability practices. One of the challenges related to the discovery, learning, and acting for sustainability requires networks of actors with vastly different perspectives, interests, and cultures operating at various levels and contexts (multi-actor innovation process) (Van Kleef & Roome, 2007). It is clear and aligns with the sustainability innovation, in which the process will involve various stakeholders, both from internal and external organizations. Waite (2014) found that managers are struggling to rethink their innovation strategy to address the inevitable complicated and unexpected problems, such as sustainability challenges because they are not only expected to consider innovation but also face pressure to act properly and achieve triple-bottom-line results.

Hunter and Cushenbery (2011) argued that a leading innovation model was proposed, indicating leaders' crucial roles in monitoring creativity and innovation while balancing the needs and expectations of diverse stakeholder groups. These two roles are labeled as direct and indirect influences of the leaders. The study found that in the early stage of a project, leaders are responsible for giving the resources and environment that promote distinctive thinking and novel idea-sharing among teammates. However, later in the process, leaders must establish market viability and eliminate ideas that are not ready for stakeholders or public consumption, then, the leaders must become an evaluator of idea potential.

A study by Seebode et al. (2012) presented four innovation space zones: bounded exploration, exploit, reframing, and co-evolve. In their article, sustainability innovation is placed in the co-evolution and reframing zones, indicating that search and selection procedures are complex in this area because it is hard to forecast what will be relevant, where the first emergence will occur, and where feedback will occur. Furthermore, in this zone, innovation will heavily entail the involvement of a diverse variety of business, governmental, and civil society partners and may use nature as a design model (Benyus, 1997). Therefore, they suggest that managers and leaders have system thinking about emerging and radically diverse solutions as well as the co-evolution of technological, organizational, and socioeconomic structures (Seebode et al., 2012). Visser and Kymal (2018) supported the finding by stating that sustainable development failure is caused by the failure to apply systems thinking, which pointed out to think in considering links, patterns, and context. Thus, from the previous researchers' studies, the complex sustainability challenge in innovation will demand a leader who owns system thinking related to work beyond conventional borders, altering the global interaction between business and society.

While technical skills and core competencies are necessary for long-term competitive advantage, the ability to outperform other organizations is primarily determined by how employees manage their interpersonal relationships. Moreover, it is clear that individual creativity and innovation are critical to the company's development and survival. Malik (2022) argued that employees' emotional intelligence is a significant factor in organizational innovation because individuals who can control and manage their emotions can overcome pressing issues, positively influencing their creativity to innovate. Similarly, Pinos et al. (2006) found that concepts of emotional intelligence such as self-awareness, self-management, social awareness, and relationship management help leaders improve their sense of self and others in order to achieve organizational goals. The findings clearly show that emotional competencies mainly affect leaders' managing emotions, specifically in building relationships with others which influence them to deliver creativity.

To address the sustainability challenge in innovation, a study suggested that a transformational leadership style may aid in stimulating innovative behavior in areas requiring creative involvement (Bass & Riggio, 2006). Transformational leaders are those who motivate and inspire people to accomplish excellent results while also developing their own leadership potential (Bass & Riggio, 2006). Given that the focus of this thesis is refining the sustainability competencies of a sustainability manager in driving innovation, a study from Knight and Paterson (2018) provided a connection between behavioral competencies and transformational leadership. The study found that the most crucial behavioral competency is the commitment to personal learning, while five of six crucial behavioral competencies relate to influencing skills. Influencing skills were assessed as transformational leaders' acts because, according to Verburg (2019), transformational leadership increases follower enthusiasm and passion for the goal, pushing followers to try new things and challenge the status quo rather than stride in lockstep with management. Therefore, it is evident that the competencies that managers should own will shape them to become transformational leaders that can positively influence various organizational innovation outcomes.

This section explains the link between leadership, sustainability, and innovation. With the high failure rate in sustainability innovation, researchers suggested that a leader in an organization adopts system thinking and a transformational leadership style that can positively affect innovation results. Furthermore, from this finding, it can be claimed that there is a strong connection between leadership and sustainability innovation.

2.4. Competencies and Innovation for Sustainability

The previous section shows the critical role of leaders in managing innovation for sustainability to long-term success in today's ever-changing business environment. This section will focus on the link between sustainability competencies and innovation that considers environmental and social impact.

Employees and the organization as a whole learn through the process of innovation. However, in some business environments, individual factors matter more than organizational factors in promoting and implementing firm-level innovation. According to Bonesso et al. (2020), individuals such as managers significantly influence the organization's innovation outcomes through their decision-making process in allocating resources, setting priorities, and filtering ideas. Bonesso et al. (2020)'s study also found that cognitive competencies appear to be important in product innovation, however, to implement this type of innovation, managers must activate cognitive competencies alongside social and

emotional competencies. Similarly, McGuirk et al. (2015) discovered that the effectiveness of managers' actions is determined not only by their tangible individual-level attributes (such as education, technical training, and industry experience) but also by the entire set of soft skills they use in their daily work. Thus, the studies delivered evidence that competencies at the individual level influence the organization's innovation processes.

In the innovation for sustainability case, Pacheco et al. (2018) argued that innovation that incorporates a triple bottom line framework requires information acquisition and learning abilities, such as absorptive capability. Moreover, researchers found that innovation in sustainability requires organizations to use competencies because it is claimed that sustainability competencies positively influence innovation in the organization (Maletic et al., 2014; Lambrechts et al., 2013). Waite (2014) stated that for a company to innovate, it should focus on leadership development in terms of competencies such as problem-solving, cognitive, and social skills. The finding is also supported by Van Kleef and Roome (2007), they argued that competencies such as networking, coalition and connection building, cooperating, systemic thinking, developing unknown possibilities, merging and integrating various innovations and issues, and learning are all critical in enhancing innovation.

Although it is found that there is only a little literature about the link between individual sustainability competencies and innovation, Nair and Bhattacharyya (2022) discovered that critical behavior and cognitive competencies increase creativity through developing stakeholder engagement capabilities and organizational understanding capabilities. In more detail, interpersonal competencies impact innovation by integrating and communicating with stakeholders both inside and outside the organization, while system thinking influences innovation by addressing complicatedness and learning in the organization. Moreover, they argued that sustainable competencies might supplement technology and R&D competencies in generating sustainable innovation, and an organization should recognize and cultivate these capabilities to create sustainable innovation.

Besides the previous study, Cillo et al. (2019) added that in managing innovation for sustainability, an organization requires not only to pay attention to internal capabilities within the organization, such as strategic management; innovation management; ambidexterity; business model innovation; information systems; knowledge management but also enhancing on external capabilities, such as strategic alliances; stakeholder theory. The study found that a firm that focuses entirely on "value addition" within the organization will not be able to compete in the long run because sustainability innovation is closely related to stakeholders who are becoming more interested in long-term performance.

It can be concluded that the link between sustainability competencies and innovation involves both the managerial and external levels. Individual sustainability competencies drive the learning capabilities within an organization while also influencing innovation by engaging external stakeholders. Furthermore, it is emphasized that firms' capabilities, stakeholder relationships, knowledge management, leadership, and culture must all be reconsidered.

2.5. Research Gap

The issue of SDGs in 2015 has influenced business organizations to form responsible management by adapting their business models to be more inclusive, environmentally friendly, and innovative. The challenges also lead organizations to the emergence of leaders in sustainability who will be responsible for achieving and maintaining a competitive

advantage. Businesses increasingly emphasize sustainability, which denotes a simultaneous focus on managing the trade-offs on economic, social, and environmental performance. However, these trade-offs are evaluated as a complex challenge of climate change and resource scarcity, forcing organizations to constantly innovate.

Based on the literature, it is found that human resources and their competencies play a critical role in influencing their company's sustainability competitiveness. It is also argued that individuals in organizations hold an important role in achieving innovation. Individual competencies, such as those in the sustainability scope, provided a critical understanding of individual-level contributions to organizational sustainability. Furthermore, from the previous discussion, studies found that individual competencies impact the organization's innovation processes in terms of managing internal and external factors, such as corporate learning capabilities and engaging external stakeholders (Van Kleef and Roome, 2007; Nair and Bhattacharyya, 2022; Cillo et al., 2019). Although it is evident that competencies can influence innovation, however, how this argument is applied to the sustainability context still needs to be determined.

To conclude, the rise of sustainability as a source of competitive advantage has driven management scholars to identify managerial and business competencies and capabilities that improve environmental performance (Van Kleef & Roome, 2007), where these competencies are also essential for managers to develop innovation and creativity in organizations. For an organization to innovate in sustainability, managers or leaders will be demanded to own specific competencies - which researchers called sustainability competencies. Section 2.2 showed that various literature related to competencies for a sustainability leader had been discussed (e.g., De Haan, 2006; Rieckmann, 2012; Wesselink et al., 2015; Wiek et al., 2011). In addition, Section 2.4 highlighted the importance of a leader in managing sustainability innovation through utilizing their competencies. However, it is still unknown how these sustainability competencies can support sustainability managers in innovating for their organizations. Therefore, this thesis will cover this gap by delivering a novel understanding of the link between these competencies and innovation.

2.6. Conceptual Framework

The strategic management concept defines several theories regarding how firms might enhance their competitive performance through interactions with other organizations. Within the theory, three approaches, see Table 1, emerged as a complement to competitive strategy market structure analysis, which explains focusing on firms' competencies in gaining sustainable competitive advantage (Hafeez et al., 2002). These theories were developed to explain the integration between the 'internal' organizational behavioral and the 'external' competitive strategy perspective (Sanchez & Heene, 1997).

In the resource-based view (RBV), it is explained that firms sustain competitive advantage when they implement a value-creating strategy that any current or potential competitors are not concurrently executing and they are also unable to duplicate the benefits of this strategy (Barney, 2000). A firm can gain a sustainable competitive advantage and outcompete its competitors by having strategic resources that are valuable, rare, inimitable, and non-substitutable (VRIN). However, this approach only applies when an industry has been reasonably stable. While in volatile contexts, for example, when new technologies or markets arise, and resource values fluctuate dramatically, another approach needs to be utilized to explain a firm's sustainable competitive advantage (Barney, 1997).

Table 1: Comparison Of The Contemporary Strategic Management Approaches (Hafeez et al., 2002)

	Resource-based view	**Competence-based perspective**	**Dynamic capabilities approach**
Concept of a firm	A bundle of resources and capabilities comprising: Tangible assets, Intangible assets, Capabilities *(Activities)*	An open system of asset stocks and flows comprising: Tangible assets, Intangible assets, Capabilities *(Managerial process)*	A system formed by processes, routines, and resources comprising: Tangible assets, Intangible assets, Capabilities *(Organizational/managerial processes)*
Competitive strategy	Controlling and exploiting strategic resources manifested in assets or capabilities	Deploying, protecting, and developing competencies resulting from the integration of assets and capabilities	Deploying and exploiting capabilities embedded in processes, and continual reshaping of the portfolio of assets
Attributes of resources/ competencies	Valuable, Rare, Inimitable, Non-substitutable	Valuable, Rare, Inimitable, Non-substitutable *(Robust for new market)*	Valuable, Rare, Inimitable, Non-substitutable *(Dynamic)*
Development method	Development of intangible assets	Development and integration of intangible assets and capabilities	Development and integration of intangible assets and capabilities
Development environment	Internal	Internal and external	Internal and external
Representative authors	(Barney, 1997)	(Prahalad & Hamel, 2003)	(Teece et al., 1997)

Secondly, the competence-based theory emphasizes that firms must play to their strengths and those areas in which they own competencies (Prahalad & Hamel, 2003). Therefore, companies must tailor their strategy to capitalize on their core competencies, which will serve as the foundation for the firm's value addition to achieve sustainable competitive advantage. One of the critiques related to this theory is that the firm's core competencies are relevant over time and become rigidities, but in reality, technological advancements and external changes can make specific competencies obsolete (Leonard-Barton, 1992). Lastly, the dynamic capabilities approach argues that a firm's competitive advantage is gained by leveraging its managerial and organizational processes and is formed by the strategic positioning of its assets and accessible path. According to Teece et al. (1997), dynamic capabilities refer to the capacity of a corporation to integrate, develop, and rearrange external and internal expertise in order to adapt to a rapidly changing environment. Within this theory, firms are considered to be able to adapt to the new environment quickly. However, in fact, it can be challenging for firms to anticipate and adapt to changes accurately.

Considering the previous theories' descriptions, this study will be more relevant to be associated with the dynamic capabilities approach. As stated in the preceding section, sustainability challenges are associated with uncertainties requiring long-term organizational strategies. In other words, in the sustainability areas, firms must be able to speed up on the newest sustainability trends and technology by modifying their business processes to meet evolving sustainability criteria. As dynamic capabilities theory is built based on the RBV perspective, the theory discusses organizations' capacity to continually adapt and innovate while employing the RBV's fundamental principles, the VRIN concept. Furthermore, Lin and Wu (2014) found that VRIN resources are strongly mediated by dynamic capabilities

to increase company performance. It is argued that firms' competitive advantages result not only from the accumulation of VRIN resources but also from developing dynamic capabilities, particularly dynamic learning capability, internally through human resource development programs and externally through strategic cooperative alliances.

By adopting a dynamic capabilities view, firms are forced to possess not only VRIN resources but also need to have the capability to adapt their competencies following environmental changes promptly. Individuals are believed to be one of the drivers for firms to innovate to achieve sustainability competitive advantage. In other words, an organization will need individuals or employees possessing innovative competencies to build its innovation capabilities (Eraut, 1998). Therefore, within a sustainable environment, individuals are required to utilize their resources, for example, their sustainability competencies, to tailor to changes in the business environment (e.g., regulations, customer preferences, or technical developments) by continuously innovating. Secondly, in terms of external context, sustainability competencies are projected to assist individuals in being more effective in working collaboratively to drive innovation (e.g., interdisciplinary working with other departments, organizations, suppliers, and customers).

This study examines how sustainability competencies can drive innovation for sustainability in organizations. These days, firms shift their businesses to become sustainable intent to achieve sustainable competitive advantage. Related to what is described in the previous paragraphs, to create value and perform a competitive advantage, firms must own VRIN resources, such as sustainability competencies. These competencies can be found at the individual level, which is important for managers to influence them in managing and implementing sustainability strategies through organizational innovation. These managers' competencies are vital in their job performance, including delivering effective innovation for sustainable competitive advantage. While the importance of individual competencies in managerial innovation is evident, their specific impact on sustainability-driven innovation remains unclear. This study explores the intersection between competencies and innovation in organizations, focusing on the three core competencies for sustainability: cognitive, emotional, and behavioral. By categorizing these competencies and analyzing them at the individual level, the study aims to help sustainability managers identify the competencies they need to enhance organizational innovation in sustainability. However, it needs to be emphasized that the research also explores other individual sustainability competencies that are possible to support a sustainability manager in doing innovation. Figure 2 shows an overview of this study's conceptual framework.

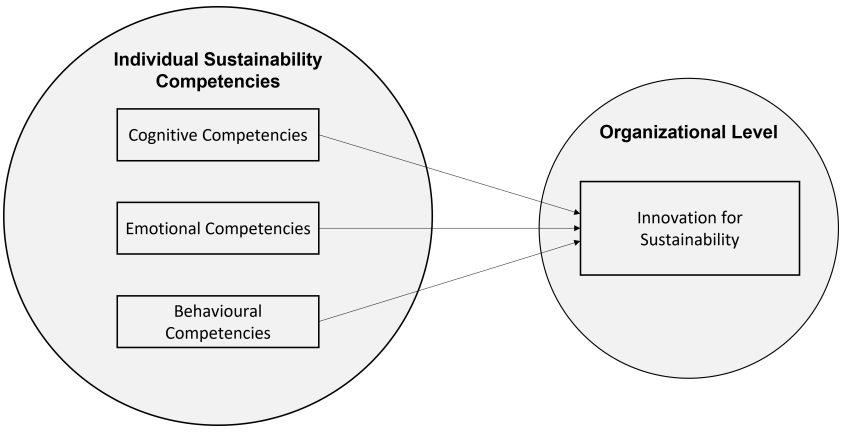


Figure 2: Conceptual Framework of The Study

Methodology

Following the objective and research questions developed in Chapter 1, this chapter presents the methodology used to describe what and why such methods were used, how the flow of the research, and how the data were collected, analyzed, and validated.

3.1. Research Methods and Research Flow

To be able to answer the main research question, *"How do individual sustainability competencies drive innovation for sustainability?"* exploratory research is used. An exploratory study will be helpful for this research because the topic of competencies and innovation in sustainability scope has not previously been studied in depth. As the study is built qualitatively, the data are collected through semi-structured interviews with several participants to gain their perspectives based on the research objective and theoretical findings.

The following part will explain the research flow, which aims to give an overview of how the research was conducted and answer the research question explained previously in Chapter 1. Firstly, the study started by identifying the problem. As described in the previous section, although it is apparent that competencies can influence innovation, how this argument is applied to the context of sustainability remains to be established. Furthermore, as the link is still unclear, managers are also in difficulty identifying what sustainability competencies need to be owned to support them in performing innovation in their organizations. Secondly, this study is continued by developing the research objective to understand how individual sustainability competencies can support organizational innovation that benefits profit, people, and the planet. Subsequently, theories related to competencies, leadership, and innovation in the context of sustainability are provided to strengthen the study and formulate the main research question and four sub-questions. To answer the research question, the research methodology is formed and explained in this chapter. Afterward, data are collected and analyzed to provide the finding based on expert perspectives. Lastly, the conclusion and practical implications are delivered, which proposes a framework.

Furthermore, the following explanation is given to clarify the flow to answer the sub-questions defined in the previous section.

- How is innovation for sustainability defined in the context of private corporations?
  In a holistic view, private organizations have considered innovations as important activities and drivers to achieve competitiveness. Discrepancy views related to innovation for sustainability discovered in the literature bring the study to more profound research on the employees' perspectives towards these activities. The previous literature showed that there are three stages in companies innovating for sustainability, which explains the position of companies in incorporating sustainability into their innovation activities. This sub-question aims to shed light on how companies in the private sector specify their innovation actions and in which position their innovation by exploring what kind of activities they are accomplishing in terms of economic, social, and environmental innovation.

- What key sustainability competencies should sustainability managers possess to drive innovation?
  It was shown that there are different competencies, including individual and organizational competencies. This study focuses on the individual level, which aims to determine how individual competencies can help drive innovation. The competencies are refined into three core competencies: cognitive, emotional, and behavioral. The sub-question is formed to understand which individual sustainability competencies are crucial for a manager in sustainability to possess. Although not only restricted to the three core competencies, this question is intended to explore other competencies that might fall outside these core competencies.
- How can sustainability competencies influence managers' capabilities to innovate in sustainability? It has been observed that leaders must effectively utilize their competencies to transcend traditional boundaries and drive innovation and change within both internal and external contexts. However, when it comes to sustainability competencies, leaders need first to grasp how these specific competencies can aid them in managing innovation. This third sub-question aimed to shed light on how sustainability competencies contribute to the development of managers' capabilities when it comes to fostering innovation for sustainability within their respective organizations. By exploring this aspect, the study seeks to provide valuable insights into how sustainability competencies empower managers to lead and drive sustainable innovation, enabling them to navigate the complex landscape of sustainability challenges and opportunities effectively.
- How do sustainability competencies fit together in a team that can bring forward innovation for sustainability in an organization?
  It was explained that organizations possess a combination of individual competencies rather than relying on a single individual with a complete set of all the required competencies. It is rare to find individuals who possess all the necessary skills and knowledge in sustainability. Therefore, the last sub-question of this study aims to explore how each competency can be effectively integrated within a team to drive innovation for sustainability. The goal is to determine the most suitable combination of individual sustainability competencies that can work harmoniously together. Hence, based on the finding, the recommendation is made to propose the fittest combination of individual sustainability competencies.

3.2. Data Collection and Analysis

Research data were obtained through in-depth interviews with three industries in the Netherlands. This section will explain the population and sample of the study, the interview method, and lastly, data collection flow.

3.2.1. Population

This study focuses on private companies that are located in the Netherlands region. The research is intended to explore the relationship between individual competencies and innovation in terms of sustainability context and propose a novel understanding for sustainability managers of which competencies that can drive innovation should be possessed by them in an organization. As stated earlier, the research is an exploratory study that aims to form a sustainability manager equipped with competencies to support them in managing innovation. Therefore, three industries were chosen to represent various industries and compare them to comprehend whether different schemes can be discovered from each other industries about how individual competencies influence innovations.

Based on the purpose of the study, the scope is defined, which is on individuals responsible for sustainability and innovation in their organizations. Thus, the research population will be individuals working in private organizations in charge of improving businesses to achieve sustainability through innovation, such as managers and subordinates in research and development (R&D)/innovation/product/project teams demonstrating a commitment to sustainability. To understand the multi-perspective, the population size is enlarged to individuals responsible for sustainability and the environment, including sustainability/environmental/Health Safety and Environment (HSE) managers and subordinates. In addition, Amabile et al. (2004) argued that the involvement of subordinates by managers in the decision-making process and their perceptions had shown a positive relationship in leading the team to success in delivering influential innovations. Therefore, both managers and subordinates are selected because it is evident that subordinates also have a role in giving their perspective on how their managers execute work and show innovative behavior towards their teams.

3.2.2. Sample

As mentioned, this study selected three industries: Construction, FMCG, and Healthcare as the population. Overall, the selection aimed to achieve variations and include multiple standpoints from different sectors. Furthermore, these industries have shown their practices in integrating sustainability into their innovation.

In more detail, construction industries were chosen because their movement toward sustainability has gained mass traction in producing green buildings through a combination of green technologies. Further, FMCG companies have applied and embedded sustainability into their practices, such as in sourcing suppliers and packaging development (Ma et al., 2020). In terms of healthcare industries, these days, the government set out Green Deal agreements with companies by emphasizing the use of technology and medicines that benefit society and the environment (Prasad et al., 2023). These compelling factors led the study to investigate how individuals in these industries harness their competencies to drive innovation and effectively navigate governmental policies and future challenges. By understanding this, valuable insights can be gained into the strategies employed by these industries to navigate sustainability initiatives and adapt to evolving circumstances.

As the population has been defined, the samples were selected using the purposive sampling method. In this case, the sampling will be limited only to individuals responsible for innovating or doing a job within sustainability areas. Participants were chosen from a combination of personal and professional connections. However, when potential volunteers were contacted, their biggest issue was a lack of either sustainability or innovation experience. After the sampling approach, 13 participants agreed to participate in this study bringing various experiences and professional backgrounds. Furthermore, to balance the perspective insight from the participants, six managers (denoted by M) and seven subordinates (denoted by S) were picked purposely. Lastly, it was considered satisfied when no new relevant data to the study topic was emerging or would emerge if further interviews were performed, therefore, saturation was defined in sampling for the study. Table 2 shows the interviewee list along with their career fields and industries.

Table 2: Interviewees Demographics

Interviewee Code	Level	Industry
M1	Manager	Construction
M2	Manager	Construction
S1	Subordinate	Construction
S2	Subordinate	Construction
M3	Manager	FMCG
M4	Manager	FMCG
S3	Subordinate	FMCG
S4	Subordinate	FMCG
S5	Subordinate	FMCG
M5	Manager	Healthcare
M6	Manager	Healthcare
S6	Subordinate	Healthcare
S7	Subordinate	Healthcare

3.2.3. Research Design

Semi-structured interviews were used in this study as a data collection method to acquire primary data and information. As stated in the previous section, the study is constructed in exploratory research where the purpose is to investigate how sustainability competencies can influence innovations. Therefore, semi-structured interviews are fit for the study as they allow the researchers to prompt or encourage the interviewee if more interesting information needs to be explained.

The interviews consisted of four sub-research topics corresponding with four sub-questions formulated in the previous part. In addition, two different sets of questions were built to differentiate between managers' and subordinates' contributions to the organizational innovation level. Firstly, interviewees were asked to define their perspective on innovation for sustainability in their organizations and how the innovation relates to their organizations' economic, social, and environmental goals. Further, the interviewees' sustainability competencies used to assist their work were explored, and how these competencies can influence innovation for sustainability was questioned. Finally, interviewees explained how their management or leaders support them in possessing their competencies and how a team should own the ideal competencies composition. Participants are divided into two groups, manager/leader and subordinate, and the approach to these groups is slightly different regarding their sustainability competencies influencing innovative behavior. The participants come from three industries: Construction, Fast Moving Consumer Goods (FMCG), and Healthcare.

3.2.4. Data Collection Flow

This part will explain how the data are collected and built systematically to produce high-quality research that enables one to reproduce and validate the study. Data collection was conducted in the following steps (See Figure 3):

Figure 3: Data Collection Flow

1. The required information related to the research question defined in Chapter 1.2 was gathered through theoretical background development, which later is used to develop the interview protocol and interview questions.
2. The second step will be preparing a formal interview invitation, Human Resource Ethics Committee (HREC) forms, Informed Consent, and Data Management Plan (DMP). The invitations were used to request interviewees' participation. Furthermore, HREC forms and Informed Consent were created to ensure data protection and processing information as the study involved humans as the subject to gain the information (See Appendix B for the Informed Consent). In addition, DMP was formed to prepare how the data, such as video recordings and transcripts, will be safely stored and when they will be deleted, which aims to minimize the risk of a data leak.
3. After the Ethics forms were approved, invitations and informed consent were sent to the participants through LinkedIn direct message and email. Around 120 invitations were sent for the interview and got a 20% response. However, only 13 people agreed to participate.
4. To ensure the clarity and alignment of the questions, the list of interview questions was pre-defined and iteratively improved through two interviews until the questions were formed clearly.
5. Before the interview, participants were asked to fill in the informed consent.
6. During the interview, prepared questions were asked to acquire information (see Appendix A for the Interview Protocol). Follow-up and probing questions were asked if there were unclear statements and if participants' arguments would be explored deeper.
7. The insight from the interview was gathered and recorded while also transcribed using Microsoft Teams to produce written answers that can be readily analyzed.
8. Lastly, the interview results were analyzed using Atlas.ti software to help produce connected answers between interviewees' responses.

3.3. Data Analysis

In this study, data collected were analyzed using content analysis with the help of computer software, Atlas.ti. Atlas.ti was used to help find a similar theme by assigning several codes between one participant's answer and others. Moreover, this process will produce word patterns in a context that will be used to present the finding of the interviews.

The analysis process in this research will follow the stages described by Braun and Clarke (2006). Firstly, the data collected were transcribed and in-depth reading repeatedly to fully immerse and familiarize with the data to reach ideas for patterns. Secondly, initial codes, such as individual competencies and innovation for sustainability related, were generated by labeling the topics mentioned by the respondents in Atlas.ti. Further, based on the codes assigned, themes were built to produce categories of the codes by relating them to the research questions. A theme indicates some level of structured response or meaning within the data set and captures something relevant about the data regarding the research topic. The next stage was reviewing the themes by fitting each theme with individual data segments and checking the data set entirely to produce patterns based on the links between the themes, for example, correlating the competencies and innovation themes to understand how these competencies can drive organizational innovations. Lastly, themes were defined and named by answering the questions, such as what each theme is about, the important

aspects, and the main message. After the process was achieved, the analytic story, according to data extracts, was connected to build a narrative story.

3.4. Validity and Reliability

This section describes the validity and reliability of the qualitative research conducted in this thesis project. Reliability and validity in qualitative research have slightly distinct definitions than in quantitative research (Sekaran & Bougie, 2016). The validity will be explained to represent how accurate the data collected is (internal validity) and how the findings can be generalized to other contexts and settings (external validity). In difference, reliability describes how well a researcher formulates the categories and how consistent the data is while other coders measure it.

In this research, two methods will be elaborated to achieve validity. Firstly, it needs to be remarked that internal validity is relevant mainly for the explanatory experiments that clearly explain the causal relationship between analyzed data (Yin, 1994). Since this research is exploratory, threats to internal validity are not critical. However, data triangulation, which involves multiple resources in the literature review stage, was conducted to ensure that internal validity is still relevant. In addition, expert interviews were conducted to provide further data triangulation of the causes that led to the current situation of individual competencies' influence on organizational innovation. Secondly, for external validity, the documentation of the data collection procedure (See Section 3.2.4) and interview protocol (See Appendix A) can be used to replicate the study, with ensures the validity to some extent. Furthermore, the findings could be generalized to other industries outside of the three industries researched in this study and, to some extent, to different teams inside the organization.

As reliability will be more difficult to be achieved, another method to ensure reliability in this study is by elaborating data discussion to ensure that interviewee viewpoints are fully represented. This will be conducted in Chapter 4 using direct quotes to allow readers to experience participants' perspectives directly instead of paraphrased or interpreted summaries of the findings. In addition, conducting various expert interviews represented diverse backgrounds to ensure that multiple points of view are considered.

Findings

4.1. Sustainability Innovation

During the interview, how the interviewees define innovation for sustainability was asked to provide an understanding of the current development related to these activities in private companies in the Netherlands. In addition, how the innovation activities related to their organizations' economic, social, and environmental goals was discussed.

In general, sustainability innovation was described as the driver of business change and transitions to accelerate the company's mission of achieving efficiency and effectiveness through integrating sustainability into the business's activities. In addition, it is believed that innovation drives employees' thinking by developing a broader perspective related to sustainable businesses. Eight interviewees stated their organizations are trying to fit their businesses' commitment by adopting the principles of reduction, reuse, and recycling (3R). These activities aim to contribute to a more sustainable future by using natural materials, conserving resources, reducing waste, and considering people's well-being and safety, which can positively impact the company's profit, the environment, and society.

In more detail, in the Construction industry, innovating aims to accelerate sustainability change missions and improve efficiencies by reducing energy consumption and construction waste (e.g., gypsum, dry walls) by applying such technologies, materials, and business transformation. For FMCG industries, innovation mainly focuses on a fully recyclable packaging portfolio and sourcing raw materials responsibly by applying the same standards to the suppliers.

> *"Innovation in our company is about fitting the commitment, which is either recyclable, reusable, or renewable. Or it is also disruptive, like system changes. However, for the moment, we mainly stick to the first three, and the big focus is on recyclable. So, we are busy delivering a fully recyclable packaging portfolio."* - M3

Lastly, the Healthcare industries primarily innovate in manufacturing medicine products without negatively impacting the environment and minimizing the single-use medical devices by creating change in the modular design. Based on the previous findings, it can be concluded that most companies innovate by improving their operational processes without changing their business strategy fundamentally.

The interviews also strived to understand the innovation activities within three dimensions related to sustainability, economic, social, and environmental.

4.1.1. Economic Innovation

Firstly, it is found that the challenge in sustainability economic innovation is balancing the production cost and the market price. Producing sustainable products for customers requires companies to provide high investment in the first place. At the same time, most customers are still reluctant to buy expensive products. Innovation in this phase will be a critical driver in achieving economic goals by developing better offers to the market.

Six participants argued that businesses should be profitable in terms of economic innovation but also responsible for what they do internally (e.g., creating a safer environment for workers) and externally by considering what the companies deliver to the markets. In addition, participants agree that innovating in sustainability means long-term goals and investments.

> *"investing in sustainability will take years for us to see the first results out of it. So that means that the corporations are also growing by retaining long-term partnerships to commit with the goals."* - M4

Supporting the previous view, it is stated that the expensive options in the beginning can be compensated for in the long run of the project. It can be derived from the findings that the challenge of innovating in sustainability demands businesses to commit to long-term sustainable goals to see the result in the future.

4.1.2. Social Innovation

In holistic views, most participants argued that their companies recognize the importance of involving the community as an important player in the sustainability journey. Through social innovation, companies contribute to sustainability by involving the local players in the loop through collaboration and co-create solutions that benefit the communities.

Several social innovation activities were mentioned, including bringing supplier diversity to a project to support small contractors (in Construction industries) and educating farmers on sustainable business (FMCG industries). Other than that, within social innovation, companies aim to establish the same criteria to their business partners, such as suppliers, to treat their employees' well-being and ensure that their partners comply with what companies have set internally. In terms of Healthcare industries, M4 argued that the social aspect is not really impacting innovation as the high standard regulations have been placed in producing the healthcare product. However, the social aspect can influence the innovation design by creating medical devices for lower economic communities.

4.1.3. Environmental Innovation

From the interview, it is discovered that all companies aim to operate their businesses responsibly toward the planet by ensuring sustainable consumption and production patterns. Furthermore, innovations for the environment were generated by improving production efficiency and lowering waste and CO2 emissions.

In more detail, S1 described that the company creates a network system by collecting and treating the waste from construction projects and turning it into raw building materials used for other projects. Other than that, several participants from FMCG industries stated that their companies conduct several shiftings not only to lower emissions produced by their production activities (e.g., sourcing natural resources) but also to deliver sustainable products (e.g., plant-based products), lastly, from a healthcare perspective, it is stated that

> *"new pharmaceuticals that coming into the market needs to abide by environmental risk assessment. So then when it goes outside of the human body, it does not become toxic to the environment as people start to realize that antimicrobial resistance is caused by the amount of antibiotics that are available in the environment and does not just affect humans, such as becomes immune to this antibiotic, but also animals and aquatic life. So there is a lot of ripple effect from pharmaceuticals that are unknowingly present in the environment."* - M6

In addition, medical business activities commit to providing more products with sustainable materials and creating circular designs by minimizing single-use products and components.

In conclusion, sustainability innovation in private companies in the Netherlands is seen as a driving force for business transformation, aiming to integrate sustainability principles into their activities. However, the activities still mainly consider as incremental innovation, which are using natural materials, conserving resources, reducing waste, and considering people's well-being and safety. Or in other words, sustainability innovation primarily concentrates on improving operational processes while aligning with the economic, social, and environmental goals of the organizations without changing the businesses radically.

4.2. Key Individual Sustainability Competencies

This section will deliver an overview of the most important and prominent individual sustainability competencies based on four groups: cognitive, emotional, behavioral, and combination. In general, all participants argued that sustainability managers must have a comprehensive range of competencies to innovate, especially in uncertain environments like sustainability. Sustainability managers with broad competencies can lead their teams in developing and implementing innovative projects that align with their organization's sustainability goals and contribute to positive social and environmental impacts.

During the interviews, more than half participants consistently highlighted the significance of intrinsic motivation as a driving force for effective sustainability innovation management. This encouragement goes beyond mere job responsibilities, reflecting a deep passion and personal commitment to making a positive difference. Sustainability managers who possess this motivation are genuinely dedicated to improving their own competencies and continuously learning, as they understand that their growth directly influences the success of sustainability initiatives within their organizations.

4.2.1. Cognitive Competencies

The first theme captured the competencies related to cognitive competencies for sustainability. It was discovered that competencies such as system thinking, adaptability competency, foresighted perspective, and technical knowledge enhance innovation. System thinking is needed for an individual to understand and analyze complex phenomena by viewing them as interlinked systems rather than isolated components. Furthermore, a manager requires future orientation to anticipate changes and possibilities by developing a forward-looking mindset. Regarding adaptability thinking, the competency enables an individual to adjust effectively in changing and uncertain environments. Lastly, technical competency is required for individuals to apply their technical principles and information specific to their industry.

System Thinking

During the interview, all participants remarked that system thinking is required for a manager to understand the complete view of the sustainability domain, including profitability, people, and the planet. As it is known that sustainability is a broad and complex challenge, managers are demanded to own specific competencies that can support them in comprehending both the more extensive overview and separating it into more minor single issues. In addition, system thinking allows managers to restructure the problems to make a big picture and analyze to translate different perspectives so that which parts are most compatible can be recognized to be worked on first in their organizations.

> *"Because if you think about sustainability, there is a system that keeps us unsustainable. And to put it extreme, we all want to change that. But you need to know which elements or chunk of their entire system you can influence. So it is about working together to understand that whole system, what elements are related to us, what we can do about it, and how we can make it quantifiable to move forward."* - M1

Future Thinking
The participants stated that future thinking was denoted by an individual's ability to have a good long-term vision, which helps in anticipating future changes and understanding how the future will unfold for sustainability. Sustainability goals as a long-term journey requiring a long-term strategy in which the transitions are usually very slow. These characteristics demand sustainability managers to focus on the goals that help them maintain where to drive towards the changes. Besides, the competencies will be helpful in predicting future sustainability changes, as it is argued that sometimes, there is a trend related to external pressures that can be expected in the future.

Adaptability Competency
Adaptability competency was mentioned by more than half of the participants. It was argued that sustainability challenges are associated with uncertainty and a continuously changing environment, adaptability will support individuals to be flexible to adjust and keep on informed to new circumstances. From the interview, it was found that within the sustainability area, technologies are becoming developed through the years, therefore, individuals require constant updating on which solutions can be applied to their businesses. Furthermore, several participants described that changes in global and local policy, such as new environmental regulations and sustainability incentives, had impacted sustainability activities, influencing individuals to adjust their businesses quickly.

Technical Competency
Six participants mentioned that technical competency would be valuable for them in managing innovation in their industry. Although it was indicated by small amount of participants, however all participants from the FMCG industry argued that to make innovation happens, individuals must be equipped with a specific understanding and background, depending on which sector they work in. For example, S3 stated that working in the food industry will be different than in the oil industry regarding regulations, market characteristics, and certification. In addition, a business background is also required for managers to understand these perspectives when doing innovations for their organizations.

4.2.2. Emotional Competencies
Theme 2 describes the competencies that include the emotional connection towards the people both inside and outside organizations as well as to environments. The most significant competencies identified during the interview were emotional empathy and embracing diversity. The finding showed that emotional empathy is important to foster a deeper understanding of innovation for sustainability by being empathetic towards other people and environments. On the other hand, embracing diversity allows individuals to recognize that sustainability outcomes will only be achieved by engaging and valuing the contributions of different stakeholders.

Emotional Empathy
Emotional empathy was referred by participants when they were talking about the dynamic and diverse teams who worked on the sustainability project, along with how they felt about

people's quality of life and the environment. However, the finding showed that emotional competencies were mentioned mainly by healthcare employees and are less relevant for individuals working in sustainability in general. Regarding working related, the competency helps participants understand the sensitivities of others' emotional responses and the best way to approach them. In terms of social and environmental aspects, it is found that owning emotional empathy helps an individual to understand the need of others and design more inclusive sustainability initiatives that can be impactful for people (e.g., involving and educating the local community) and the environment (e.g., lowering the use of plastic and carbon emissions).

Embracing Diversity
Participants argued that different cultures and situations forced them to have the ability to grasp different feedback and perspective of stakeholders quickly. This competency enables sustainability managers to navigate complex cultural contexts, develop inclusive sustainability strategies, and design impactful innovations that genuinely resonate with stakeholders' needs and aspirations. By embracing this competency, sustainability managers can foster meaningful engagement, collaboration, and positive social and environmental impacts, ultimately advancing the journey toward a more sustainable business.

> *"We need strong empathy when designing products for a medical team and physician that will be standing the whole day. They already have complex problems to solve a patient. So bringing a new solution that is more sustainable is one thing. But also ensuring it doesn't make their work harder is another thing. That is especially when we talk about modularity or reusability. That means someone will assemble, clean, store, and charge the product. And yeah, that is a mental burden for the staff. It is building solid empathy to understand where is the right place to play to bring innovation in sustainability while always considering the best of the user experience."* - M5

4.2.3. Behavioural Competencies

The third group of competencies describes how individuals adopt and demonstrate their sustainable behaviors towards others can enhance innovation in their organization. From the interview, interpersonal competencies help individuals to collaborate and actively listen to stakeholders' suggestions. Besides, it was argued that effective communication refers to an individual's ability to convey sustainability concepts and goals clearly. Furthermore, continuous learning competency is required for a manager to enhance their sustainability knowledge. The last competency found is being able to persuade stakeholders to drive positive changes.

Interpersonal Competency
During the interview, it was described that sustainability projects involve various stakeholders striving to achieve different goals. Therefore, it is required for a manager to take into account stakeholders' need to deliver win-win solutions.

> *"Does our innovation proposed really what people need, and do the people ready for this kind of thing yet? So we need to know about that, and if we get more insights into it, I think it will be more suitable for society because we know what people want, and maybe we know what people need and then work on it, not just focus on creating products from the perspective of an engineer or technician."* - S6

In addition, the competency will be valuable because by being able to manage stakeholders, a stakeholder relationship will most likely be built, which can create beneficial networks. A broader set of people means various opinions regarding new concepts, however, connecting their interests will be an essential aspect of delivering possible solutions. Some examples mentioned during the interview are the need to understand the issues up to the farmers' level in FMCG industries, workers in construction industries, and doctors in the healthcare industries.

Effective Communication
In general, participants argued that effective communication bridges the gap between technical knowledge and public awareness of sustainability principles, making them more accessible and practical. Almost all participants mentioned that the competency is one of the most necessary skills to be possessed by a manager. It was discussed that working for innovation in sustainability often involves complex ideas and concepts that must be communicated, delivered, and easily understood by the teams and external stakeholders, such as consumers. Furthermore, S2 agreed that sustainability managers are demanded to be able to talk effectively to different types of people both within and beyond their fields by building the correct narrative and being informative for their organizations.

Continuous Learning
More than half participants mentioned that innovating for sustainability demand individuals to keep curious to expand their knowledge and be open to possibilities. Sustainability is inherently dynamic and constantly evolving, making it essential for sustainability managers to stay updated on new systems, technologies, and developments not only within the sustainability field but also across various disciplines. Furthermore, the competency helps to support the reflective processes. While numerous solutions are available, finding the most suitable and effective innovation to address specific sustainability challenges can be daunting, in which it requires thoughtful analysis, consideration of diverse perspectives, and a willingness to embrace a prolonged iterative process. Therefore, possessing this competency will allow an individual to understand and embrace this long process.

Influencing Competency
Influencing competency was described as an influential ability to communicate the importance of innovation for sustainability to the stakeholders. It was explained that objectifying a new idea, especially sustainability requires an individual to be persuasive to get the organization on board. Presenting a compelling case for sustainability initiatives is essential to inspire others and drive meaningful change. In addition, it is argued that:

> *"You need to be inspirational, influential, and show the right way. And if you have the confidence to show that this is the right way, people, of course, will follow. So this is very important... In my job, I often see very skeptical people, and very difficult to move from one position like they are stuck in their place. They have created their comfort zone, and to really take those people out of their comfort zone and to show them that there is a brighter future coming and that we need to wool together in that direction can sometimes be a challenge."*
> - S4

Furthermore, it was mentioned that consumers sometimes need to be convinced to make them want to change their preferences from conventional to sustainable products or to make users understand the importance of a better environment and people's quality of life. Therefore, the ability to influence enables an individual to become informative and persuasive about sustainability initiatives to their business and external stakeholders.

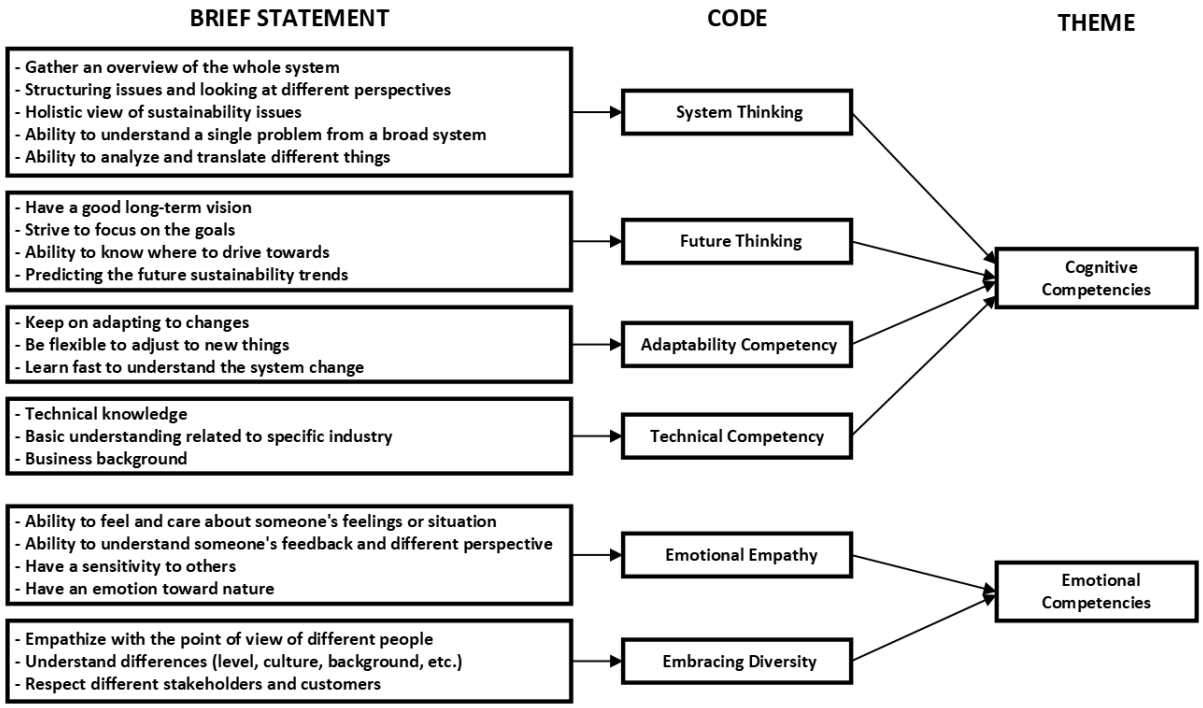
4.2.4. Combination of The Competencies

Integration competency emerges as a comprehensive competency that encompasses cognitive, behavioral, and emotional aspects, in which those three groups take a role in enhancing the competency. It was described that integration competency is the ability of individuals to connect diverse ideas and understand how to implement them in their organizations that can further deliver innovation.

Integration Competency

Eleven of thirteen participants mentioned that integration competency enhances their ability to manage innovation. Firstly, the competency enables managers to set their teams' objectives regarding what innovation should be pursued. Secondly, it helps individuals see how the knowledge outside their businesses can fit into their companies. It is mentioned that innovating for sustainability demands managers to look beyond their industries and examine how to implement solutions or technologies from the outside into their businesses. Lastly, M1 explained that possessing this competency will help an individual understand the relevance and importance of innovation to be executed in their organizations.

To summarize the findings of the competencies, Figure 4 represents several brief statements from participants that specify the relevant code through the analysis of interview documents, obtaining eleven competencies codes. The competencies then be grouped based on four categories, three core competencies groups, and one emerges as the combination of these core competencies. While cognitive competencies were argued to be important in encompassing individuals' intellectuality for driving innovation, emotional and behavioral competencies play a role in building stronger stakeholder relationships and creating a sustainability culture in their organizations. Collectively, emotional, cognitive, and behavioral competencies equip leaders to create a conducive environment for innovation to succeed. In addition, integration competency was also discovered as the ability to effectively combine and align various resources and stakeholders to achieve common goals, ensuring the successful implementation of sustainability innovations.



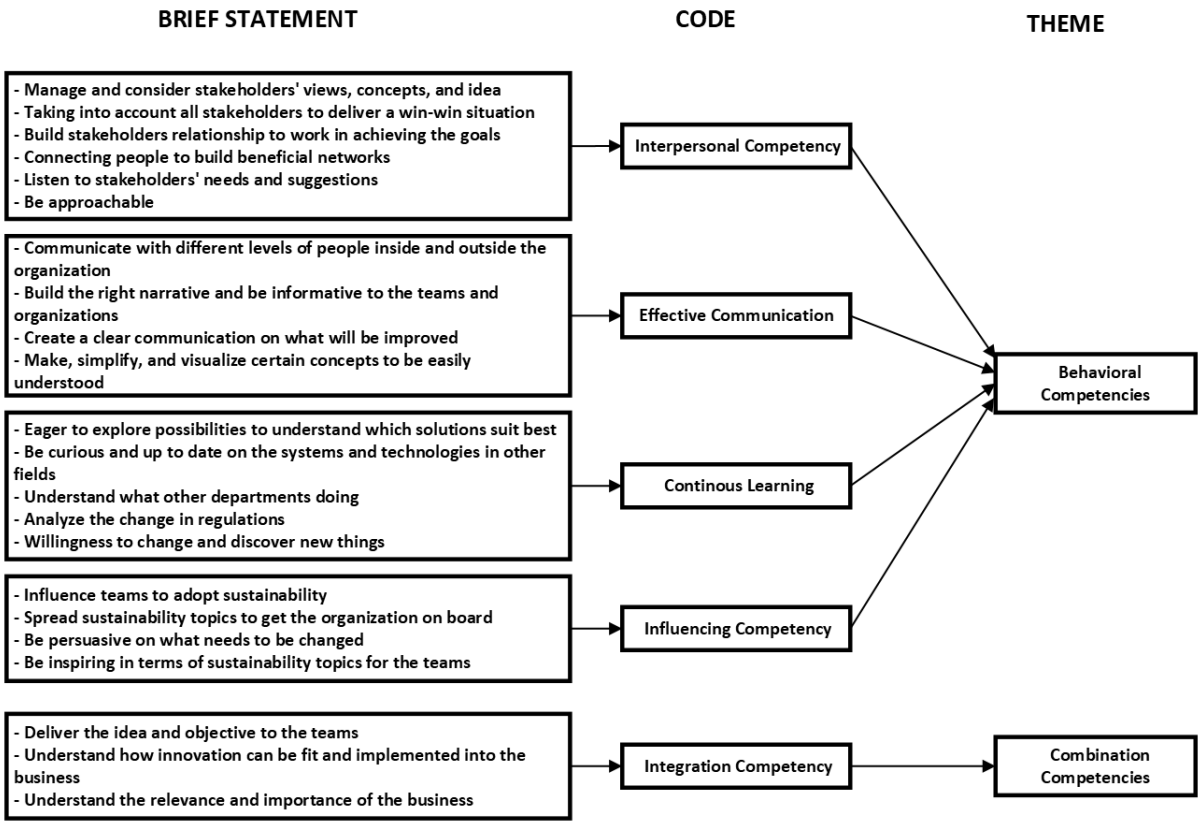


Figure 4: Individual Sustainability Competencies

4.3. Sustainability Competencies in Influencing Managers' Innovation Capabilities

To answer sub-research question three, participants were asked how the sustainability competencies they mentioned can influence individuals' innovation capabilities, referring individuals to sustainability managers. Further, how the breakdown competencies can drive managers in enhancing innovation will be delivered. In general, it was described that by encompassing a range of sustainability competencies, managers could navigate sustainability challenges in their organizations and drive their teams to innovate toward long-term results. In more detail, participants argued that the competencies possessed by individuals enhance managers' capabilities by assisting them in identifying opportunities for sustainability innovation, understanding stakeholders' perspectives, and leading internal and external stakeholders to adopt sustainability.

4.3.1. Cognitive Competencies and Innovation Capabilities

During the interview, it was found that there were two most prominent codes related to how cognitive competencies can influence managers' capabilities in innovating.

Firstly, cognitive competencies were described as impacting the development of teams' learning capabilities by strategizing to influence the learning culture, which can further lead to the production of new ideas and approaches to sustainability challenges. In more detail, S3 stated that managers could reflectively think about which competencies needed to be possessed by them and their subordinates so that they are prepared and trained to innovate for their organizations.

Secondly, it was argued that cognitive competencies help managers to understand the complex and broader interrelationships between social, economic, and environmental domains. By possessing the competency, managers will be capable of quickly identifying interdependencies of the extensive system and enabling them to build innovative solutions that simultaneously address various aspects of sustainability. In addition, from the more significant analyzing the system, managers are able to acquire system knowledge of sustainability through understanding the life cycle analysis, which can be applied to innovate, for example, in lowering the amount of waste.

> *"...conducting life cycle assessment make me realize that packaging is a really big issue in waste and not only that but gold markers in medical equipment and long-lasting components at the end of life are even more important than just the plastic shell,.."* - M5

4.3.2. Emotional Competencies and Innovation Capabilities

Participants have associated emotional competencies with their ability to address more comprehensive needs. It was found to be an important characteristic that can help managers understand different stakeholders' perspectives, which can be utilized to develop sustainable innovation. Furthermore, the competency drives managers to listen to others actively and empathize with different viewpoints. As it was argued that the sustainability challenge is a complex problem involving various stakeholders with different purposes, managers should be able to consider their needs and identify how to bring practical innovations to the specific issues according to what people need.

> *"It is again to understand what the people need, ... for example, sometimes people cannot accept the change I propose because, again, with all the limitations that I have. Then you need to have this mentality, of course, sometimes people don't know and can't accept it. So we need to like receiving feedback and then continuing to learn from it."* - S5

In addition, the competency enables managers to engage diverse stakeholders, for example, in terms of their perspectives, background, culture, and experiences. It was argued that by embracing the multiperspective of opinions, individuals could efficiently foster an inclusive and collaborative environment that encourages diverse people to contribute to innovation. Besides, possessing the competency helped him better address the stakeholders' needs by co-creating sustainable solutions.

4.3.3. Behavioral Competencies and Innovation Capabilities

In terms of how behavioral competencies drive managers' capabilities in innovating, it was found during the interview that the competency can help managers to influence stakeholders that further facilitate the implementation of sustainability innovations. The finding showed two key ways of how the competency affects innovation capabilities.

Firstly, all participants agreed that sustainability challenges require collaboration both from internal and external stakeholders. The competency to influence stakeholders will be needed for managers to build partnerships and engage them in the innovation processes to foster sustainability initiatives in their organizations. M2 argued that to succeed in improving the situation, managers are demanded to collaborate and understand various needs to deliver a win-win situation for all stakeholders involved in the chain so that they can gain something and are included when the change happens

Secondly, it was found that the competency facilitates an individual in effectively leading the execution of innovation through a change management process. As it is clear that the change in achieving sustainability business demands an organization to transform its organization, managers with strong change management competencies will be an important aspect in creating a supportive learning environment. In addition, managers equipped with the competency can easily navigate the resistance to change by communicating the benefits of innovation for sustainability to the stakeholders.

4.4. Sustainability Competencies in a Team

In response to sub-research question four, participants were also asked how individual sustainability competencies could fit together in a team that can promote innovation in their organizations. In general, all participants argued that diverse competencies are needed in a team to build a collaborative network by complementing each other to deliver an innovative environment. In addition, it was described that by having diverse competencies in a team, each member could contribute their unique expertise, and together they could achieve significant sustainability initiatives that contribute to the organization's capabilities.

Each participant mentioned which competencies should be owned by a team to manage innovation for sustainability. Firstly, it was argued that a communicator is needed for a team to connect people both from inside and outside organizations. Besides, as it is clear that sustainability is a complex challenge, communicators assist the innovation in translating ideas by visualizing companies' sustainability concepts toward their stakeholders to enhance the occurrence of improvements. Secondly, both managers and subordinates agreed that a person with technical knowledge equipped to analyze future data would help understand the market trend and quantify the organization's performance, allowing businesses to comprehend their current state and on which the innovation should be pursued.

The third competency needed is the combination of future thinking and stakeholder management. It was found during the interview that the continuous changes in regulations and policies demanded that the companies be updated on what new things need to be complied with while innovating. In addition, S1 argued that a person experienced in the governmental domain would be valuable in terms of permitting agreements, especially in the construction industry where loads of authorization need to be obtained. Lastly, it was described that continuous learning would be needed within a team to drive their organizations to improve and innovate to deliver sustainable products and services. The competency will enhance the team to explore new sustainable technologies and ideas by challenging the team to drive their organization's innovation.

4.5. Summary of The Findings

The following section will answer the main research question. Participants have indicated the importance of sustainability managers in possessing competencies to drive their organization's innovations. The link between the two topics is that individuals with unique sustainability competencies are more likely to engage in innovative activities inside organizations by enabling them to understand sustainability challenges and identify opportunities on which initiatives can be delivered to solve the problems. Three patterns will be explained further in this section, resulting from the answer to sub-research questions in the previous sections.

Following the interview information, Figure 5 presents a conceptual model explaining how sustainability competencies can lead to innovation for sustainability. More particularly, managers' crucial competencies for innovating act as a bridge, which further creates a pattern on how their combination of capabilities can enhance innovations by expanding organizational capabilities. Companies can build their organizational capabilities by bringing together individuals with distinctive competencies, which can deliver valuable innovation to their stakeholders. In addition, the interview also demonstrated the need for sustainability managers to engage and collaborate with broad stakeholders to achieve a holistic approach by creating comprehensive and integrated innovation strategies.

Firstly, managers with sustainability competencies increase their organizations' capabilities in enhancing the learning process, which is characterized by their initiatives in reflecting and influencing which competencies need to be improved by their organizations to drive sustainability innovations. In more detail, most participants agreed that sustainability issues are complex and demand individuals working on its innovation to be open to new solutions continually. The competencies, such as cognitive and behavioral, help the managers process organizational knowledge to modify and integrate employees' behavior to reflect on the new situation, such as sustainability scope, to improve their performances. In addition, the competency contributes to building the learning capacity of individuals, which further can enable the effective spreading of this knowledge throughout the company, aiming to achieve sustainable competitive advantage through innovation jointly.

The findings highlight the importance of collective knowledge acquisition, application, and sharing within organizations. When individuals effectively engage in these processes, it fosters a culture of innovation and enables organizations to adapt to changing environmental demands, driving sustainability initiatives. The interviews revealed that organizations with strong learning capabilities reflect on the outcomes of their sustainability initiatives, learning from both successes and failures. Moreover, they prioritize continuous employee development and learning to enhance competencies in sustainability-related areas, equipping individuals to deliver novel sustainability innovations.

Secondly, the competencies assist managers in collaborating with various stakeholders by creating environments that foster sustainability innovation. It was found through the interview that the competency enriches the co-creation of sustainability initiatives by effectively managing internal and external stakeholders. Furthermore, behavioral and emotional competencies are believed to take roles in, for example, social innovation that mainly involves empathy competencies to understand how companies can manufacture their businesses without sacrificing people's quality of life and the environment. Besides, with many stakeholders in sustainable challenges, the competency also drives managers to involve them in the loop, which by understanding their expectations, companies can develop innovative sustainable products and services.

With this capability, organizations can leverage stakeholders' expertise and resources to drive sustainability innovations that satisfy all stakeholders' goals. This approach enables the co-creation of solutions that resonate with stakeholders' values and needs. Furthermore, this collaborative capability fosters a culture of trust and open communication, building long-term relationships and securing ongoing support for sustainability efforts. Aligning with the evidence stated in the previous section, a long-term partnership will be required to achieve a broader sustainability impact both for the company and external stakeholders.

Lastly, sustainability competencies drive innovation by assisting individuals in engaging stakeholders to build influential relationships of actors' networks. In the process of retaining, companies often face rejection from external parties in terms of adopting sustainability, thus they are expected to be persuasive in engaging new people and maintain it for fostering the organizations' innovation process. For these reasons, individual competencies, such as behavioral competencies, are needed to help managers lead the change of stakeholders to actively contribute to sustainability innovation by influencing others to achieve innovation for sustainability cooperatively. By bringing multiple parties into the process, companies can build an environment that enables them to exchange ideas and information effectively. Besides, acknowledging diversity competencies allows managers to comprehend how stakeholders perceive the innovation, assisting individuals to highly empathize with others' perspectives.

The capability of the organization to lead sustainability adoption will be beneficial to involve broader stakeholders, which fosters a sense of collective ownership and shared responsibility towards sustainability initiatives. In other words, inclusive engagement ensures that a wide array of perspectives and expertise is taken into account, enriching the innovation process and increasing the likelihood of developing comprehensive and contextually relevant sustainability solutions. Moreover, a company can leverage this capability to increase the acceptance of sustainability initiatives, especially on the consumer side.

In conclusion, the participants' answers have shown that individual sustainability competencies drive innovation through the development of organizational learning capabilities in processing knowledge, collaboration capabilities for delivering sustainability initiatives, and engagement capabilities to adopt sustainability. To achieve these capabilities, managers must accommodate their subordinates by demonstrating good inspiration in managing sustainability innovation and forming which competencies are crucial to be owned, influencing subordinates to adopt competencies. Furthermore, it was stated that as most participants believed that they understand the practical issues on their team more than their managers or management in higher functions, they expect management to give opportunities and flexibility regarding what sustainability competencies they want to pursue. Thus, it presents two ways of communication between management support and individuals to achieve organizational capabilities.

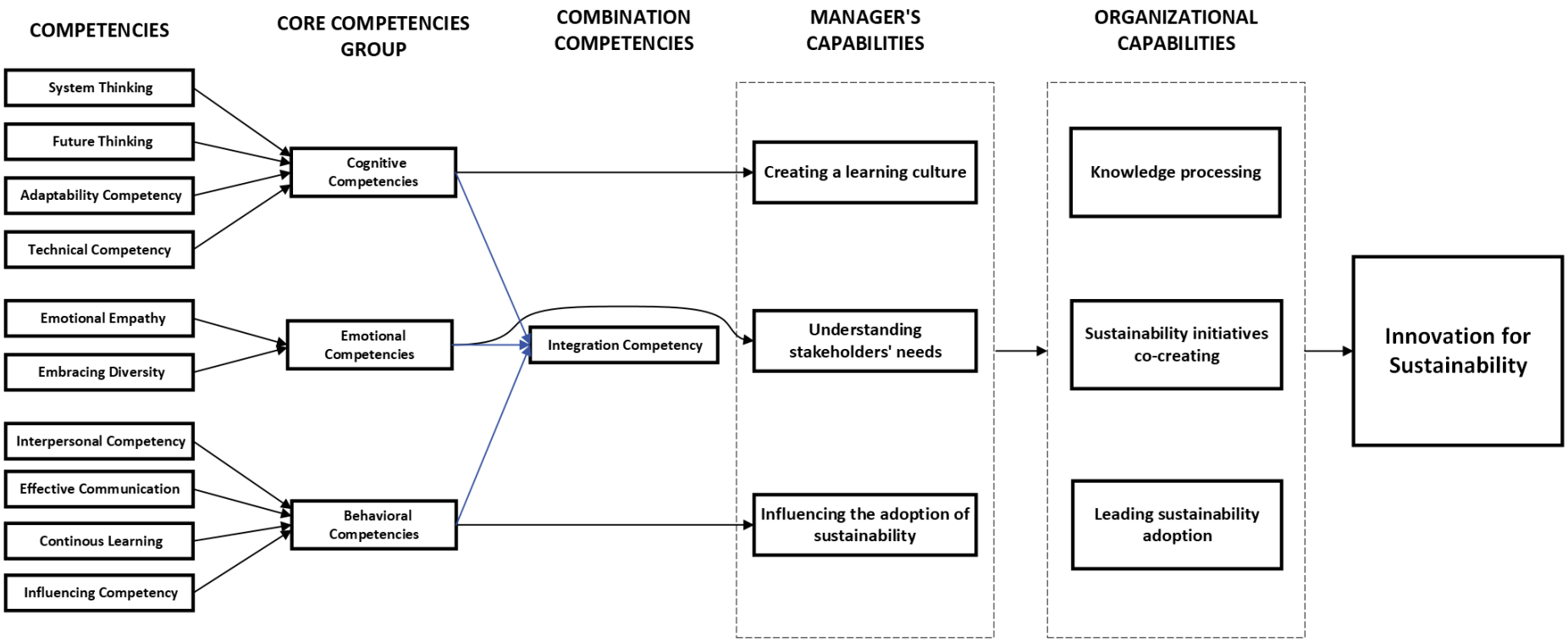


Figure 5: Sustainability Competencies and Organizational Capabilities in Driving Innovation

Discussion

This chapter explores the expert interviews' findings and integrates them within the more significant scientific literature covered in the preceding chapters. As stated in Chapter 1, this research aims to understand the relationship between how competencies can drive innovation in a sustainability context. Therefore, the result of this study has shed light on the literature regarding the individual-level influences on the organizational level of sustainability innovation, focused on the core competencies and three different industries.

5.1. Analysis of The Findings

The study started to explore the innovation activities that companies in the Netherlands perform. It was found that the innovations are still limited to the reduce, reuse, and recycle activities without changing their business principle, and this innovation is considered incremental improvements to business as usual. Referring to Adams et al. (2016)'s model of sustainability-oriented innovation (See Figure 1), for a company to deliver integrated sustainability activities, firms require to strategize in shifting their people's mindset on the sustainability activities they want to achieve. In this phase, leaders have an important role in driving innovation through their values and aspirations (Dyllick & Hockerts, 2002), denoted by their capabilities in influencing their subordinates. In addition, the transformation of companies recognizes the necessity of leadership and external knowledge in value chains (Adams et al., 2016), such as interaction with suppliers and customers, to accomplish sustainable innovation.

Previous authors have described several competencies considered crucial for individuals in managing sustainability. The competencies such as system thinking (Redman & Wiek, 2021), future thinking (Redman and Wiek, 2021; Wiek et al., 2011; De Haan, 2006), emotional empathy (Nair & Bhattacharyya, 2022), embracing diversity (Wiek et al., 2011), interpersonal competencies (Redman & Wiek, 2021), effective communication (Wiek et al., 2011; Crofton, 2000), influencing competencies (Knight & Paterson, 2018), integration competencies (Redman & Wiek, 2021) have been mentioned before in the literature. However, the study found that adaptability competencies, technical competencies, and continuous learning are required to be owned by individuals to manage innovation for sustainability. In which the competencies contribute to the list of sustainability competencies that specifically assist managers in doing sustainability innovation.

One interesting finding during the interview was the possession of emotional empathy competency for individuals working in sustainability. De Haan (2006) and Nair and Bhattacharyya (2022) emphasized the importance of this competency for managers, as it fosters care and compassion among stakeholders, thereby enhancing innovative behavior, particularly in social innovation. However, this study found slightly different results because the empathic concern was recognized as relevant for participants working in Healthcare industries and less applicable for the other two sectors. Similar to what Vassallo et al. (2023) defined, it was found that emotional empathy (e.g., being compassionate to others and the environment) was less useful than cognitive empathy (e.g., understanding stakeholders' expectations), especially in the implementation of the innovation process.

The study's findings shed light on the role of sustainability managers' competencies in driving innovation for sustainability and shaping capabilities formation. Cognitive competencies play a crucial role in enabling managers to exhibit sustainability leadership. They achieve this by fostering a learning culture within their teams and empowering team members to develop sustainability competencies. This, in turn, equips teams with the ability to identify innovative solutions to tackle sustainability challenges effectively. On the other hand, emotional competencies are vital for managers as they facilitate active and collaborative engagement with stakeholders. By understanding and empathizing with the diverse expectations and needs of stakeholders both within and outside the organization, managers can foster an environment conducive to developing further innovation, ensuring that innovative solutions consider the prevailing interests and concerns.

Lastly, the behavioral competencies of managers significantly contribute to their capabilities in driving change management and integrating sustainability into an organization's innovation activities. Managers can create a culture of sustainability within the organization, encouraging employees to embrace and support the necessary changes. Moreover, effective communication competencies enable managers to articulate and convey the importance of these changes to stakeholders, gaining their support. Overall, the finding underscores the multifaceted role of sustainability managers' competencies in fostering innovation for sustainability. Managers can advance sustainability innovation within organizations and the broader context by leveraging cognitive, emotional, and behavioral competencies.

After understanding how the competencies can enhance managers' capabilities in managing innovation, the study also intended to know how the competencies could fit in a team to foster innovation for sustainability. The finding will be useful for managers to understand what competencies should be possessed by them and their subordinates, and, in another way, subordinates can reflect on what competencies they should develop further to enhance innovation in their organizations. The previous section has shown that diverse individuals lead the team to achieve innovative environments. It was discussed that sustainability challenges require individuals to build a collaborative environment. Multi-stakeholder interactions in a structured partnership contribute to creating sustainability strategies through learning from stakeholders and creating formal future agendas (Dentoni et al., 2012). Other than that, as it seems unreasonable to have all competencies, individuals should balance and acquire in-depth expertise in one or two competencies from each group while collaborating continuously to complement each others' competencies.

The results contribute to knowledge management and innovation literature by identifying the intersection of the two topics, clarifying how individual competencies can influence innovation for sustainability in organizations. A pattern has indicated that the interaction of participants with their colleagues and external stakeholders has developed their firms' capabilities in managing innovation for sustainability. More than half of the participants described that exposing themselves to diverse environments has brought them to develop a holistic view of realities, enabling them to innovate to serve a broader system. Similarly, Bhatt (2000) argued that core competencies lay the groundwork for the development of organizational capabilities by bringing and integrating employees' knowledge and skills within the organizations.

The competencies such as system thinking, future thinking, technical competencies, and continuous learning allow individuals to handle enormous information within sustainability

areas, thereby increasing their knowledge on an individual level. Besides, this characteristic forces sustainability-oriented companies to strive for openness to learn from others and understand the interests of both external and internal stakeholders to deliver innovation. This learning activity to maintain or improve performance based on experience is exhibited as an organizational learning capability (DiBella et al., 1996). Furthermore, antecedent literature argued that individual knowledge acquisition must be made available at the organizational level in order for it to be integrated into collective knowledge for the firm to benefit from these individual competencies (Jerez-Gomez et al., 2005).

The competencies of emotional empathy, embracing diversity, and interpersonal competencies are utilized by participants to create sustainability initiatives collaboratively. Most participants associated their emotional competencies with better communication with others, leveraging their teams to establish positive relationships for innovation. Moreover, the competencies enable individuals to broaden their understanding of several aspects of stakeholders, which improves their capabilities to see new connections between persons and develop innovative solutions. Kleiner and Roth (1997) stated that one of the most crucial success variables in organizational transformation programs is the quality of interpersonal connection, which depends on the openness of the management conducting the programs. It is similar to what was found from the interview that individuals promote collaboration by utilizing their competencies in networking, and organizations incorporate a collaborative activity in their strategies that deliver the success of partnerships, contributing to shaping the collaboration capability.

The last pattern discovered is how individuals contribute to innovation sustainability through stakeholder engagement capabilities formation. The competencies of integration, influencing, and practical communication empower individuals to drive the adoption of sustainability within innovation projects. Equipped with these competencies, individuals effectively integrate external and internal information, enabling the realization of innovation. Sharing ideas enhances the adoption of sustainability initiatives, thereby encouraging a diverse range of actors to be involved in the decision-making process for the issues that necessitate innovation. Furthermore, possessing the competencies will equip managers to deliver sustainability concepts to customers, increasing the acceptance rate of innovation. It is argued that effective communication between organizations and users through user integration in product development could facilitate organizational and individual learning processes, resulting in sustainable product development (Hoffmann, 2007).

To conclude, individual sustainability competencies drive innovation for sustainability through the formation of organizational learning, collaboration, and stakeholder engagement capabilities. Furthermore, it must be remarked that these capabilities, an organization's collective competencies, result from investments in staffing, training, compensation, communication, and other human resource areas, reflecting the methods by which people and competencies are brought together to accomplish tasks. Although the study focuses on the individual level of competencies, the discussion showed the role of organizations in developing and building a supportive environment through companies' routines for individuals to utilize their competencies in driving innovations.

5.2. Theoretical Implications

Researchers have investigated the necessary competencies for individuals to handle sustainability in their organizations effectively. While previous research focused on cognitive and

emotional competencies, this study expanded it to include behavioral competencies, thus providing a comprehensive set of core competencies to drive sustainability innovation.

Cognitive and emotional competencies enhance innovation directly through the development of stakeholder capabilities and organizational learning capabilities (Nair & Bhattacharyya, 2022). However, the study proposed how the competencies shaped managers' capabilities to innovate before eventually forming organizational's capabilities as a result of the individual's interaction with internal and external stakeholders. The study found that managers can contribute to organizational innovation by possessing a broad range of competencies, helping them achieve a learning culture, understanding stakeholders' needs, and increasing the adoption of sustainability to deliver sustainability innovation. Subsequently, organizational capabilities are formed as diverse individuals' competencies are combined through collaboration and engagement.

Furthermore, the findings contribute to the strategic management theory by highlighting the role of individuals as a source for organizations in gaining competitive advantage. While sustainability challenges have forced organizations to act adaptive and continuously reconfigure their resources, individual sustainability competencies can be viewed as essential resources that businesses can include in the form of organizational capabilities. Aligned with dynamic capabilities (Teece et al., 1997), the study showed the importance of individuals dynamically adjusting their competencies based on the market demand and challenges. By constantly modifying and expanding the competencies, individuals provide VRIN resources that can be leveraged for innovation by their organizations, offering organizational knowledge protection during significant change.

5.3. Practical Implications

The outcomes of the interview findings have shown how individual competencies can drive innovation for sustainability through developing organizational capabilities. Through the discussion, it was found that organizational managements also play a significant role in assisting individuals in building their capabilities. The present study will indicate how the competencies could effectively deliver influential innovation for sustainability by managers in organizations. Some recommendations are the following.

Individual Level

- Sustainability managers must actively participate in various training programs that suit the specific needs of their businesses to build the abilities required for effective management. The interview described the need for managers to develop their competencies according to which industry they work in, as different sectors bring different issues to be tackled. For instance, the construction industries may focus on reducing waste, optimizing energy consumption, and implementing circular economy principles. On the other hand, FMCG companies may prioritize minimizing packaging waste, supply chain sustainability, and responsible sourcing.
- Managers need to possess a dynamic mindset that embraces continuous learning. This means actively seeking out new information and being open to adapting their approaches based on emerging best practices. By cultivating a culture of constant learning, managers create an environment that encourages employees at all levels to seek knowledge, share insights, and embrace innovation. This culture becomes an assertive driver of growth and improvement within organizations, fostering creativity, adaptability, and a forward-thinking mindset.

- The finding showed the need for individuals to be intrinsically motivated to achieve a better future by harnessing their internal drive, passion, and personal values. To foster intrinsic motivation, leaders can create an environment that nurtures autonomy, such as developing their competencies to drive sustainability innovation, leading them to higher engagement and productivity in innovating.

Organizational Level

- Organizations must communicate a clear and unified understanding of sustainability to their employees. Since sustainability terms can have varying translations, it is crucial for employees to actively comprehend and engage with the sustainability initiatives specific to their organization, for example, company want to achieve CO2 neutral by 2030. Companies can align their goals and objectives by establishing a shared understanding of sustainability encompassing environmental, social, and economic aspects. This enables managers to effectively integrate sustainable practices into daily operations, thereby promoting innovation that benefits profitability, people's quality of life, and the environment.
- Companies should integrate sustainability initiatives throughout all levels and aspects of their organization rather than exclusively focusing on high-level activities. It is recommended to establish key performance indicators for sustainability in every innovation project. This ensures that sustainability becomes embedded in the organization's thread, affecting decision-making and shaping project outcomes at every step. Adopting this holistic approach to sustainability enables firms to meet their objectives and cultivates a culture of responsible and forward-thinking competencies, leading to positive ripple effects throughout the organization and beyond. It reinforces the idea that sustainability is not a separate initiative but an integral part of the organization's overall strategy and success, developing its capabilities
- As for the recruitment process, organizations and companies should take into consideration the compatibility between their sustainability strategies and the competency profile of the candidates who aspire to be in charge of sustainability and innovation activities. By prioritizing the alignment between candidates and organizations' strategies in the recruitment process, organizations can strengthen their commitment to sustainability and foster a culture of innovation that propels them toward a more sustainable and resilient future.

Figure 6 presents the proposed framework based on practical implications to improve sustainability competencies for sustainability innovation, which can be adopted by organizational management and individuals responsible for sustainability as a roadmap to achieve these long-term goals.

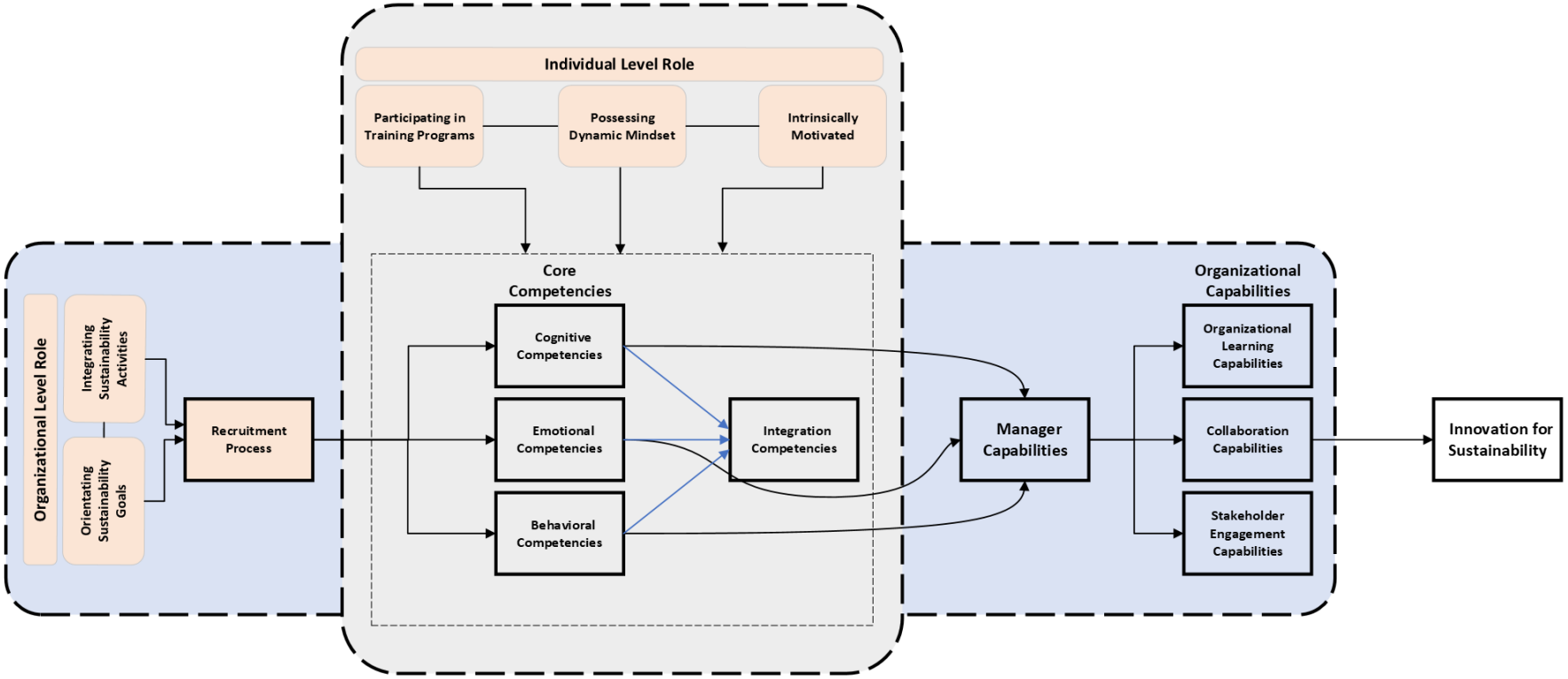


Figure 6: Proposed Framework For Enhancing Sustainability Competencies For Innovation in Organizations

5.4. Limitations and Future Research

Understanding the link between two different research scopes, competencies, and sustainability innovation, will be challenging, especially because of their dynamic characteristics. Therefore, this chapter will deliver the limitation of the study and future research opportunities for a better contribution to management and sustainability literature.

5.4.1. Research Limitations

In the case of management research, specifically understanding individual competencies, it is important to study the development and deployment of certain competencies and capabilities inside a specific firm or network. It is because when researching competencies, it is necessary to analyze the context and account for its potential impact on the outcomes. However, conducting such research necessitates a longer duration as it involves longitudinal studies that track how individual competencies are utilized, developed, and applied in managers' daily work, which becomes this study's limitation. Adopting this approach can help researchers gain more valuable insights into the effectiveness and practicality of various competencies over time, enabling a more comprehensive understanding of their impact on managerial performance and organizational outcomes.

Another limitation of this study is the relatively small sample size and narrow range of industries represented in the interviews. While the insights gained from the current participants are valuable, a broader participant pool would enhance the generalizability of the study's findings within a broader context. Furthermore, the characteristic of competencies is complex in terms of multifaceted and context-dependent, making it challenging to understand only from three different industries. Therefore, by including participants from diverse industries, backgrounds, and experiences, the study would be better positioned to capture a more comprehensive understanding of which crucial individual competencies for influencing sustainability innovation, which this study has not grasped.

As the research is conducted entirely by one researcher, it presents a potential limitation as it heavily relies on the judgment and interpretation of one person. In particular, the selection of quotations, categorization of data, and attachment of relevant elements to the transcripts are susceptible to the researcher's subjectivity, which can significantly impact the overall outcomes and findings of the analysis. In addition, subjectivity may also happen from the participants' side as they might deliver socially desirable responses, leading to answers that do not accurately reflect the real practices. Thus, these limitations can introduce bias and compromise the overall integrity of the findings. Therefore, efforts should be made to enhance the study's objectivity through rigorous methodologies, such as including data triangulation to reduce the risk of subjectivity.

5.4.2. Future Research

As future research, it is recommended to conduct a longitudinal study assessing how individual sustainability competencies can drive innovation over time to track the progression of competencies within specific industries or networks. Furthermore, the relation framework in Figure 5 can be used to evaluate the link between competencies that lead to innovation in the organizational context, obtaining practical insight that further confirms the framework's validity and effectiveness. The proposed framework for enhancing the competencies by utilizing management and individual role in Figure 6 will be worthwhile when tested in the real-world context, for instance, in specific firms through multiple case studies methods. In

addition, future research should consider adopting a mixed-methods, such as qualitative and quantitative approaches to collect more comprehensive data. This process will provide multiple sources, which leads to less subjectivity.

Several research efforts which this study has not covered can be further evaluated to gain a deeper understanding of sustainability competencies and innovation in organizations.

- Investigate the relationship between sustainability competencies and innovation while exploring potential moderators and mediators that may influence this relationship. Identifying moderators, such as organizational culture or leadership styles, can shed light on the conditions under which sustainability competencies have a stronger or weaker impact on innovation outcomes. Moreover, exploring potential mediators, such as employee engagement or knowledge sharing through training and development programs, can help uncover how sustainability competencies translate into innovative sustainability practices. These approaches are expected to help organizations develop targeted strategies to enhance their sustainability capabilities.
- Explore the link between managers' competencies and specific sustainability innovations elaborated on in the economic, social, and environmental innovation domains. By focusing on these distinct dimensions of sustainability innovation, researchers can uncover the specific competencies that are crucial in driving advancements in each discipline. By evaluating the competencies necessary in each innovation domain, Future research can give significant insights for firms wanting to establish tailored competency frameworks and training programs that empower managers to drive sustainable innovations across several dimensions.
- Research on the relationship between sustainability competencies and specific responsibilities or positions in the sustainability department will be beneficial for managers in assigning suitable responsibilities to their subordinates based on individuals competencies. By investigating this link, managers can acquire valuable insights on properly allocating appropriate tasks to their subordinates, aligning their skill sets and competencies with the activities for which they are responsible. Understanding this connection can lead to more efficient and effective workforce management, driving organizational success in sustainable practices and initiatives.

Conclusion

In pursuing sustainability development, the responsibility for addressing the challenges has fallen mainly on private businesses, which are expected to drive innovation. However, this process is recognized as a complex and multifaceted ”wicked problem” due to its complex nature and involvement of diverse stakeholders, often with limited available solutions. With these arguments, individuals possessing specific competencies within organizations are increasingly acknowledged as significant contributors to advancing these long-term sustainability goals.

While there is substantial literature on individual-level sustainability competencies, there is a notable research gap regarding how the competencies drive innovation within the sustainability domain. This study seeks to address this gap by focusing on three core competencies and examining their relationship to organizational innovation. To achieve this, an exploratory approach was taken, utilizing a semi-structured interview methodology. Thirteen participants from diverse backgrounds across three industries were interviewed to gather firsthand data based on their experiences and perspectives. By exploring these competencies and their impact on innovation, this study aims to shed light on the connection between individual sustainability competencies and organizational innovation within the context of sustainability.

The thesis presented a new insight into the competencies required for sustainability managers to drive innovation, expanding the existing range of sustainability competencies. It also introduced a comprehensive framework that demonstrates the link between individual sustainability competencies and innovation for sustainability. This framework highlights the pivotal role of managers' capability development, emphasizing the significance of their interactions and collaborations in shaping organizational capabilities. Furthermore, the result showed that possessing a wide range of individual sustainability competencies helps managers shape their innovation capabilities. Then the capabilities will be spanned, shaping the pattern in which their combined capabilities can enhance innovation by expanding organizational capabilities. Three patterns emerged: organizational learning capabilities, collaboration capabilities, and stakeholder engagement capabilities, which contribute to sustainable competitive advantage through sustainability innovation activities. These patterns underscore the significance of collaboration and engagement with internal and external stakeholders.

In addition to its primary findings, the study put forth a practical framework that individuals and management can utilize to enhance their sustainability competencies at the individual level. This framework offers valuable insights and actionable implications that can be applied in real-world settings. By following the framework, individuals and management can actively develop and strengthen their sustainability competencies, equipping themselves with actionable initiatives necessary to drive sustainability innovations. The practical implications outlined in the framework provide a roadmap for continuous improvement and growth, enabling individuals and organizations to make tangible progress toward their sustainability goals. By embracing these practical implications, individuals and management can contribute to sustainable development goals.

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Interview Protocol

A.1. Semi-structured Interview (Manager)

Introduction

- Thank you for the participant's availability,
- Explaining the research project and the goal of the interview regarding how individual sustainability competencies drive innovation,
- Explaining the duration and structure of the interview,
- Requesting to record and turn on the automatic transcription,
- Assuring the participant's anonymity, not publishing the transcript/video-recorded, only available to research staff, and planning deletion of recordings,
- Collecting informed consent,
- Giving the interviewer's contact information.

Demographic Questions

1. Participant ID# :
2. Date :
3. Name :
4. Email :
5. Job Title/Position :
6. Industry or Career Field :

Initial Questions

1. What was your educational background?
2. What was your previous working experience?
3. Do you lead a team members/subordinates?
4. What are your main responsibilities in your organization and how many years have you been experiencing for managing sustainability or innovation for sustainability?
5. What are the barriers or challenges that you face in managing sustainability and innovation?

Innovation for Sustainability

1. How do you define innovation for sustainability in your organization?
2. Can you describe what sustainability-related activities have been done or are being done in your organization?
3. Can you describe how innovation relates with economic goals in your organization?
4. Can you describe how innovation relates with social goals in your organization?
5. Can you describe how innovation relates with environmental goals in your organization?

Individual Sustainability Competencies

Individual sustainability competencies are atomized behavioral and knowledge items extracted from specific job descriptions or can be seen as effective managers and leaders knowledge, abilities, and attributes that support them in managing sustainability.

1. In general, what competencies are helpful for you in managing innovation for sustainability?
2. How important it is for a manager/leader in sustainability to own sustainability competencies in terms of supporting innovation for sustainability?

   Core Competencies:

   - Cognitive : associated with the ability to think or analyze information and situations (e.g., system thinking, future orientation, embracing diversity, interdisciplinary, action competence in innovating).
   - Emotional : ability to analyze, comprehend, and interpret ones emotions in relation to a task or situation to perform better (e.g., empathy, nature connectedness, and a sense of transcendence).
   - Behavioral : observable behavioral act demonstrating a professionals knowledge, skill, and ability (e.g., changed-oriented behavior, personal learning, influencing skills)

3. Can you explain what cognitive, emotional, and behavioral competencies do you use to support your work?
4. Can you explain what other competencies (outside cognitive, emotional, and behavioral competencies) do you use to support your work?

Individual Sustainability Competencies and Innovation for Sustainability

1. In holistic view, how do you think sustainability competencies can help an individual to drive innovation that strives triple bottom line (profit, people, and planet)?
2. In your opinion, how do the competencies can influence the innovative behavior of yourself and your subordinate?
3. How do you think/how important cognitive competencies can influence innovation for sustainability?
4. How do you think/how important emotional competencies can influence innovation for sustainability?
5. How do you think/how important behavioral competencies can influence innovation for sustainability?

Management/Leader Influence

1. What do you do in developing sustainability competencies that can produce an influential innovation for your organization?
2. How does your management assist you in developing your sustainability competencies?
3. What do you expect from management to support you in developing sustainability competencies?
4. How do you think the ideal sustainability competencies should be owned by a team?

A.2. Semi-structured Interview (Subordinate)

Introduction

- Thank you for the participant's availability,
- Explaining the research project and the goal of the interview regarding how individual sustainability competencies drive innovation,
- Explaining the duration and structure of the interview,
- Requesting to record and turn on the automatic transcription,
- Assuring the participant's anonymity, not publishing the transcript/video-recorded, only available to research staff, and planning deletion of recordings,
- Collecting informed consent,
- Giving the interviewer's contact information.

Demographic Questions

1. Participant ID# :
2. Date :
3. Name :
4. Email :
5. Job Title/Position :
6. Industry or Career Field :

Initial Questions

1. What was your educational background?
2. What was your previous working experience?
3. Do you lead a team members/subordinates?
4. What are your main responsibilities in your organization and how many years have you been experiencing for managing sustainability or innovation for sustainability?
5. What are the barriers or challenges that you face in managing sustainability and innovation?

Innovation for Sustainability

1. How do you define innovation for sustainability in your organization?
2. Can you describe what sustainability-related activities have been done or are being done in your organization?
3. Can you describe how innovation relates with economic goals in your organization?
4. Can you describe how innovation relates with social goals in your organization?
5. Can you describe how innovation relates with environmental goals in your organization?

Individual Sustainability Competencies

Individual sustainability competencies are atomized behavioral and knowledge items extracted from specific job descriptions or can be seen as effective managers and leaders knowledge, abilities, and attributes that support them in managing sustainability.

1. In general, what competencies are helpful for you in managing innovation for sustainability?

2. How important it is for a manager/leader in sustainability to own sustainability competencies in terms of supporting innovation for sustainability?

   Core Competencies:

   - Cognitive : associated with the ability to think or analyze information and situations (e.g., system thinking, future orientation, embracing diversity, interdisciplinary, action competence in innovating).
   - Emotional : ability to analyze, comprehend, and interpret ones emotions in relation to a task or situation to perform better (e.g., empathy, nature connectedness, and a sense of transcendence).
   - Behavioral : observable behavioral act demonstrating a professionals knowledge, skill, and ability (e.g., changed-oriented behavior, personal learning, influencing skills)

3. Can you explain what cognitive, emotional, and behavioral competencies do you use to support your work?
4. Can you explain what other competencies (outside cognitive, emotional, and behavioral competencies) do you use to support your work?

Individual Sustainability Competencies and Innovation for Sustainability

1. In holistic view, how do you think sustainability competencies can help an individual to drive innovation that strives triple bottom line (profit, people, and planet)?
2. In your opinion, how do the competencies can influence the innovative behavior of yourself and your fellow colleagues?
3. How do you think/how important cognitive competencies can influence innovation for sustainability?
4. How do you think/how important emotional competencies can influence innovation for sustainability?
5. How do you think/how important behavioral competencies can influence innovation for sustainability?

Management/Leader Influence

1. What do you do in developing sustainability competencies that can produce an influential innovation for your organization?
2. In what ways does your manager/leader influence you in possessing sustainability competencies?
3. What do you expect from management to support you in developing sustainability competencies?
4. How do you think the ideal sustainability competencies should be owned by a team?

Informed Consent

Thank you for your willingness in participating to this study. This study is being done by Yovanka Elisabeth from TU Delft with the study titled Individual Competencies of a Sustainability Manager in Driving Innovation.

The purpose of this research study is to provide an understanding of the critical sustainability competencies that can drive innovation that a sustainability manager should possess, and it will take you approximately 30-45 minutes to complete. The interview consists of open-ended questions in an audio-recorded semi-structured interview on what sustainability competencies are crucial to be possessed by sustainability managers and how these competencies can drive innovation in your organizations. Further, the data collected will be used for the master thesis of Yovanka Elisabeth.

As the interview process will involve online activity, such as video recording, your personal information and your answers in this study will be kept strictly confidential. I will reduce risks by completely anonymizing the interviews in the thesis. Personal information (name, e-mail address, occupation) will only be collected for thesis-related purposes (e.g., informing the study's supervisor). The data will be securely stored on my personal TU Delft OneDrive, and the interview transcription will be anonymized. With your permission, the interview will be video-recorded and automatically transcribed using Microsoft Teams, and I will manually adjust the automatic transcription to match the original spoken words. The transcripts and recordings of the interviews will be available only to the thesis supervisor, will not be published elsewhere, and will be deleted one month after the thesis project is completed, around September 2023. Furthermore, your participation in this study is entirely voluntary, and you can withdraw anytime and pass over any questions.

Below you can find the informed consent form for this research. Please tick the appropriate boxes to indicate your consent; alternatively, we can record your answers during the interview. If you have questions, you can contact me at: Yovankaelisabeth@student.tudelft.nl.

The contact details of the Responsible Researcher/Supervisor of the thesis are as follows:
Dr. N. (Nikos) Pachos-Fokialis
N.Pachos-Fokialis@tudelft.nl.

Table 3: Informed Consent

PLEASE TICK THE APPROPRIATE BOXES	**Yes**	**No**
A: GENERAL AGREEMENT RESEARCH GOALS, PARTICPANT TASKS AND VOLUNTARY PARTICIPATION		
1. I have read and understood the study information above, or it has been read to me. I have been able to ask questions about the study and my questions have been answered to my satisfaction.		
2. I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason		
3. I understand that taking part in the study involves:		
• A video-recorded interview will be conducted via Microsoft Teams. • The interview will be semi-structured with open-ended questions related to individual competencies that should be owned to manage sustainability. • The video recording will be transcribed as a text directly from Microsoft Teams; the researcher will edit the text to eliminate any mistakes from the automatic transcription; this will be conducted by listening to the recording of the interview and adjusting the written transcription to the original spoken text. • The interview recording will be stored on the personal account of Yovanka Elisabeth on the TU Delft OneDrive and will be destroyed one month after the research has been completed.		
4. I understand that I will not be financially compensated for my participation.		
5. I understand that the study will end by September 2023.		
B: POTENTIAL RISKS OF PARTICIPATING (INCLUDING DATA PROTECTION)		
6. I understand that taking part in the study involves the following risks.		
• The risk of leaked personal information • The risk of leaked business/organization strategies • The risk of reputation damage from leaked information I understand these will be mitigated by publishing only aggregated data (code book and combination of analysis of all the interviews). The transcripts of the interviews will not be mad publicly and will only available to the thesis supervisors. Personal information will not be published or made available to anyone not involved in the research. Furthermore, I can choose how to respond to each question that may be detrimental to me/my organization (e.g., business strategies). I may choose not to respond to any of them and I have the option to end the interview at any time.		
7. I understand that participating in the study also entails collecting specific personally identifiable information (PII) (name, contact information, occupation) and associated personally identifiable research data (PIRD), with the risk of my identity being revealed, the risk of re-identification and the subsequent risk of affecting my public or professional reputation.		
8. I understand that some of this PIRD is considered as sensitive data within GDPR legislation, specifically job position and organizational view.		

9. I understand that the steps outlined below will be taken to reduce the risk of a data breach and protect my identity in the event. The interview will be conducted in complete anonymity. Personal information will not be published or made available to anyone who is not involved in the research. After the research is completed, the personal data will be deleted.		
10. I understand that personal information collected about me that can identify me, such as my name and contact details, will not be shared beyond the study team.		
11. I understand that the (identifiable) personal data I provide will be destroyed after the research has ended. This will be conducted 1 month after the graduation of the researcher, which is anticipated to be around September 2023.		
C: RESEARCH PUBLICATION, DISSEMINATION AND APPLICATION		
12. I understand that the de-identified information I provide will be used for the following purposes after the research study. The master thesis and the interview results will be made public on the TU Delft Repository (https://repository.tudelft.nl/). The anonymized coding of the interviews will be included in the appendix of the master thesis.		
13. I agree that my responses, views, or other input can be quoted anonymously in research outputs		
D: (LONGTERM) DATA STORAGE, ACCESS AND REUSE		
14. I give permission for the de-identified data and the results of the interviews, such as the combination of encoded answers from all respondents to be included in the thesis which will be archived in the TU Delft repository (https://repository.tudelft.nl/). The transcribed interviews will not be made available to the public or stored on the TU Delft repository.		
15. I understand that access to the repository where the master thesis is stored is openly available on the internet.		

Signatures

_____ Date:

Name of participant

Interview Summaries

C.1. Participant M1

- Responsibilities
  Focusing on sustainability innovation, change, and improving the way of working
- Sustainability innovation challenges or barriers
  - the openness and willingness for the organization to adopt a change, such as sustainability
  - the culture and governance of the organization
  - the core of the business that restricts going further from traditional businesses
- Sustainability innovation
  - sustainability innovation is viewed as a process to accelerate an organization's mission by integrating various strategies
  - leading to achieving a mission where sustainability is front and center
- Sustainability competencies
  - proactively start a change and keep them moving
  - a combination of patience and impatience by being willing to give people time to adjust or adapt and having the motivation to move on to whatever people are thinking
  - listen to people and understand people's perspectives while trying to take them along in the initiatives
  - have the flexibility to pivot
  - have the ability to keep oversight and analyze things quickly
  - ability to know how and where to drive things forward
  - understand sensitivities in terms of what people think and how we can then approach them
  - willingness to discover new things
  - need to embrace the failures
  - ability to look at things from the outside-in
- Sustainability competencies and their influence to the team
  - possessing competencies assist in helping people to think in solutions rather than in issues
  - help in understanding the team's perspective toward the issues
  - help in solving the problem by seeing it practically
- Sustainability competencies and innovation
  The huge intrinsic motivation for sustainability, such as making the world better, is not enough, knowledge and competencies will be required to complement it to drive things forward because we need to know in depth what you are talking about, what it takes, what the issue is from a global perspective, and what do we see in our environment. Not only that, understanding from an internal perspective is useful to know what is the status of our own progress and what we need to do to deliver the innovation.

- Competencies needed in a team
  - having a visionary and long-term thinker
  - team driver to achieve goals and set milestones
  - doers that can own and execute projects and keep things moving
  - data analysts to quantify and have quantifiable indicated
- Things to do to develop competencies
  - participating in training
  - creating more space for others' views to understand them better
  - experimenting with design thinking
- Leader/management support
  - allowing and giving me the space and opportunities to take training
  - arranging training related to sustainability, innovation, and its impact
- Expectation to leader/management
  Expecting openness to new suggestions

C.2. Participant M2

- Responsibilities
  Product developments, innovation, and sustainability. Focus on what sustainability aspects are relevant for the company and business, how to quantify and measure it, and how to improve it to take the role in the circular economy
- Sustainability innovation challenges or barriers
  - money is one of the barriers because when we design something alternative, it is always a small part of the market
  - a huge barrier to starting when you have something new, do people want to pay more for the more expensive, sustainable, and some other parts better alternative
  - sustainability is a complex topic; the production process produces pollution that is something for the society
  - there are companies as the front runners and moving fast, but at the same time, some other parts do not move fast enough to balance the system
- Sustainability innovation
  Creating furniture products by transitioning from conventional to detachable, which will decrease the use of harmful material for the environments
- Sustainability competencies
  - continuously learning and embracing the situation where the solutions are not there yet
  - being up to date with the developments in the market because innovation is a continuous process
  - ability to look at what solution can be applied to our situation and that can help our customers' problems
  - the ability to gather all the information in the market and evaluate these options
  - being able to communicate with people on all different kind of levels
  - have a driving mindset to move forward
  - ability to structure and zoom in and out the problems
  - being clear on what sustainability aspects we are trying to improve
  - have to be curious about technologies beyond our business scope

- Sustainability competencies and their influence to the team
  - help in communicating the process of product development
  - equip me in the process of change management, which influences people to think along with me and follow me in the process of innovation so that the result can satisfy all stakeholders involved
- Sustainability competencies and innovation
  The competencies help me to perform the innovation, as I believe the more suitable a person for the job, the better you utilize it.
- Competencies needed in a team
  For sustainability innovation, the competencies need to be woven between diverse individuals within a team
- Things to do to develop competencies
  - joining courses and training
  - be interested in improving the competencies
  - be more self-steering towards what I want to achieve or do
- Leader/management support
  Support in being an open company, in terms of developing competencies and accepting suggestions
- Expectation to leader/management
  - expecting my company to have a good long-term vision
  - sharing the roadmap on how to achieve the goals together so that I can see what my role is in the whole process and how I can support the company and the other way around

C.3. Participant S1

- Responsibilities
  Leading sustainability projects for the European region, working with the main contractor mainly in life science projects
- Sustainability innovation challenges or barriers
  Within construction industries, there are many project life cycles and various steps, which make it more complex
- Sustainability innovation
  - defining innovation on doing new things while improving efficiencies by reducing energy needs, decarbonizing energy, minimizing waste quantities, and increasing waste diverted from landfill
  - we reuse waste such as gypsum board and dry walls for raw material
  - we are enhancing biodiversity considerations, dealing with data centers where energy availability is the main problem. Therefore, we are applying a connection with a solar plant will build to take power from there
  - with water scarcity issue, we facilitate in building wastewater treatment plant within the data center
  - as the data center that we build generates heat, we reuse it to give this energy back to the community in a sense
- Sustainability competencies
  - the ability to achieve a win-win situation

  - being critical of what kind of design is being implemented
  - having a critical mindset and exposure to the environmental sustainability features
  - the ability to connect available solutions with the specific problems in the construction industry
  - having knowledge about the construction industry, such as how to recycle materials, how excavation works, and how to avoid cross-contamination of materials
  - the ability to understand the whole cycle of getting something out from the ground until you recycle it
  - understanding the status of where things sit currently and how they can be applied
  - seeing whether the idea of innovation is realistic and can be implemented or not
  - ability to participate in the decision making
  - active listening to new suggestions
  - ability to express ideas in a forum
  - influence people and engage them in the decision-making process
  - be able to identify the stakeholders and translate the information in a way that could be easily understood by them
  - being empathetic help in building relationships with others

- Sustainability competencies and their influence to the team
  - possessing competencies helps in bringing interest for the team to participate in innovating for sustainability
  - strategizing to approach people to adopt sustainability

- Sustainability competencies and innovation
  As sustainability is always associated with improving something, then competencies help in strategically thinking about how to achieve a win-win situation, identify which innovation is suitable for the company, and communicate the ideas on board
- Competencies needed in a team
  - a person with documentation skill and data analyst for specific roles
  - communicative person
  - the person that understands regulation and permitting process

- Things to do to develop competencies
  - getting educated specifically in sustainability topics
  - increasing sensitivities in terms of emotionally by talking to people and getting on sites to train people

- Leader/management support
  - providing support educationally and giving me time to be educated
  - giving me the opportunities to express myself more and by being able to communicate the information on a higher level
  - frequently meeting with senior management and discussing innovation and project opportunities so that exchanging and influencing ideas will be easier

- Expectation to leader/management
  Expect more time for discussion with senior management so that my influencing skills can be improved

C.4. Participant S2

- Responsibilities
  As a sustainability consultant where I have to translate both internal and external perspectives of sustainability. Doing all kinds of projects which relate to energy monitory and forecasting, CO2 emission reduction on a portfolio basis for clients
- Sustainability innovation challenges or barriers
  - being able to promote sustainability to clients
  - comfortable in the status quo
- Sustainability innovation
  Sustainability innovation in our field is related to reducing cost and using natural materials. Achieving sustainability by adopting Paris Agreement in reducing emissions
- Sustainability competencies
  - ability to understand customers' perspective
  - translate our knowledge in an understandable manner
  - understand the concept of sustainability on all kinds of levels, for example, energy usage, user involvement, energy distributions
  - have practical knowledge, such as heating installation, making sure there's clean air
  - understand issues from the broad perspective
  - have the ability to talk to different kinds of people within our fields, different levels, and various customers
  - be enthusiastic about the topics
  - ability to connect various stakeholders' interests
  - highly analytical and investigate the topics
  - effectively communicate sustainability concepts
  - the ability to position me on stakeholders' perspectives
- Sustainability competencies and their influence to the team
  Possessing competencies helps me in leading my team in the process of innovating by orientating my fellow colleagues to think differently about the subject at hand and consider a broader spectrum
- Sustainability competencies and innovation
  - although we are confronted with a lot of stakeholders, possessing competencies help me in understanding innovative solutions for customers
  - help to think in a broader network of people and actors
- Competencies needed in a team
  - a person who understands the specific construction field
  - a person who can translate innovation in a simple manner
  - communicator person for building connections with customers
  - a person who understands the legislative or governmental domain
- Things to do to develop competencies
  Keep developing the competencies by continuously exposing myself to various resources, talking with professionals who are in the field that is related to sustainability concepts

C.5. Participant M3

- Responsibilities
  Influence sustainability projects to go for the best packaging available in terms of recyclability or in terms of carbon footprint. Compare the different options that are on the table with our internal tool to pick the most sustainable option
- Sustainability innovation challenges or barriers
  - the efficiency of the operations in the factories in the manufacturing sites
  - availability of alternatives material
  - more sustainable options come with a higher price
- Sustainability innovation
  - sustainability innovation that we do is trying to fit the commitment in recycling, reusing, and renewable. While also going for disruptive system changes
  - we buy back the empty packaging that is difficult to be recycled, and we start to recycle it
  - we deliver environmentally based products to reduce the amount of nitrogen consumed
- Sustainability competencies
  - influencing various levels so that sustainability can be spread around the organization itself
  - trying to be empathetic with those who are not on the right side of the sustainability
  - active listening to people's points of view
  - continuously have a dynamic mindset to learn
  - have a social awareness of the value
- Sustainability competencies and their influence to the team
  Having the competencies make me feel more engaged and belonging to the organization and team, and therefore, we build the vision together to achieve that team's spirit mindset to innovate for sustainability
- Sustainability competencies and innovation
  Having competencies will make a difference in terms of the influence of innovations. On one side, you have to influence people to adopt the innovation, but you also need to have a social responsibility for the people you are trying to influence. You need to have a people understanding of what the value of the social and natural capital
- Competencies needed in a team
  Diverse competencies that could complement each individual within a team
- Things to do to develop competencies
  Join the training and develop a growth mindset in the company
- Leader/management support
  - they provide training and tools
  - help in addressing which competencies should be developed
  - create a plan to grow and change the mindset in possessing competencies
- Expectation to leader/management
  Personalize course to develop cognitive, behavioral, and emotional competencies

C.6. Participant M4

- Responsibilities
  A buyer and project lead in sourcing sustainable materials
- Sustainability innovation challenges or barriers
  - traceability and transparency from the material suppliers
  - hard to validate that suppliers also adopt sustainability
- Sustainability innovation
  - we are trying to deliver products while at the same time complying with sustainable goal developments
  - we try to educate suppliers to achieve a regenerative agriculture
  - building long-term partnerships to achieve a commitment from both parties
- Sustainability competencies
  - staying up to date with sustainability because it is such a new topic
  - understanding and translating the broad topic
  - try to think out of the box
  - the ability to collaborate and help each other out with different stakeholders to collectively working out toward sustainability
  - ability to translate the concept to the stakeholders
  - a need to have future thinking with a long-term vision
  - understanding broad topics in terms of sustainability
- Sustainability competencies and their influence to the team
  Competencies help me in influencing and engaging my team to be more responsible and contribute to sustainability
- Sustainability competencies and innovation
  Competencies are tools to achieve innovative solutions by building strategy together with others
- Competencies needed in a team
  - diverse individuals with various competencies
  - decision-makers
  - an individual that can connect internal and external stakeholders
  - an outside-of-the-box thinker
- Things to do to develop competencies
  - stay up to date both from internal and external information
  - join training
  - discuss heavily with other knowledgeable persons
  - connect with people internally who are also having sustainability goals
  - up to date on my company industry
- Leader/management support
  - proving the strategies and platform
  - flexible in terms of giving approval
  - supportive in the way of possessing competencies
- Expectation to leader/management
  - more budget for training
  - more flexible on which competencies I want to possess

C.7. Participant S3

- Responsibilities
  - working in a sustainability team specifically for the sustainable sourcing team
  - responsibility for supplier sustainability compliance, making sure that our suppliers comply with the company's sustainability standard
  - managing internal audit on sustainable material to strengthen the internal process
- Sustainability innovation challenges or barriers
  - how to communicate the innovation or improvements internally as the company has various stakeholders, different targets, goals
  - deliver understanding to stakeholders that sustainability will not limit your move to innovate and still ensure that the company achieves profitability
- Sustainability innovation
  - create a process to ensure whether the supplier complies with company policies to be a business partner
  - achieving competitive advantage and value propositions for a company in adopting sustainability based on customers' demand
- Sustainability competencies
  - the ability to engage internal stakeholders
  - communicate the improvement projects and make sure stakeholders have the same knowledge
  - analyze data regarding sustainability measurements
  - predicting the future of sustainability trends, for example, government regulation, and making sure to translate the information to the company
  - understand how and when to approach stakeholders
  - continuously learning specific industry domain
  - the ability to preset the right propositions to the senior management
- Sustainability competencies and their influence to the team
  Having the competencies make it easier for me to influence other teams to adopt sustainability, which realizing them to innovate for sustainability
- Sustainability competencies and innovation
  The competencies equip me to catch up with the industry pressure, which further allows me to think innovative solutions
- Competencies needed in a team
  - a person who possess behavioral competencies in influencing to achieve the company's target
  - a person who understands the practical things and technicalities
  - communicator to connect the team
- Things to do to develop competencies
  - self-learning and joining a training
  - keep up to date as sustainability is something new, and it keeps developing
- Leader/management support
  - support by creating a target that set for me
  - assign sustainability goals for the project

  - deliver a good example of possessing sustainability competencies

- Expectation to leader/management
  - providing more training
  - make sure that the employee catch up with the sustainability trends

C.8. Participant S4

- Responsibilities
  Responsible for designing sustainable packaging
- Sustainability innovation challenges or barriers
  As sustainability is still in the transitioning phase, materials mostly in the packaging world are linked to a higher cost
- Sustainability innovation
  - we try to lower the amount of CO2 in all aspects, from sourcing the raw materials to energy and ingredients that are consumed in the process of producing the products
  - we are responsible for what we are putting and selling on the market while still being profitable
- Sustainability competencies
  - we need to be open to a yes to try something new to hear about the new idea, new information, new development
  - the ability to see how the solution can fit into our businesses, products, and markets
  - ability to persuade the customers that sustainability is the right thing to do
  - be informative to our business, for example, the supplier
  - be able to work on more complex projects, it does not have a pattern and needs an out of the box solutions
  - be adjustable, work on higher pressure
  - need to be careful and feel personal about environments
  - personal drive to make a change
  - understand technicalities about the business, for example, how CO2 is calculated, what the consumer packaging interaction going on
  - need to be inspiring and understandable, as sometimes, for the consumer, it is difficult to understand sustainability
  - need to be inspirational and influential in that sense showing the right way to change the management
  - ability to understand how the solution can be fit to the business
  - require a lot of thinking, analytical, analyzing, and planning the project
- Sustainability competencies and their influence to the team
  The competencies enable me to influence my team to adopt sustainability by showing how the innovation can fit the business and market and which one would make the most sense to save the cost. Therefore, the teams will understand and support the projects as they know that the idea is potential. I shadow what I have done with others
- Sustainability competencies and innovation
  - the competencies keeping me motivated to innovate that consider not only profit but the future planet and people's well being

  - innovation for sustainability is a long-term process, which might not always be so interesting, but I can still be very motivating because I understand the consequences of what I am doing
  - the competencies also help me in constructing the ideas for sustainability

- Things to do to develop competencies
  - learning by doing; the more I am in the company, I can recognize myself growing more into those competencies
  - sharing knowledge with experts from different teams

- Leader/management support
  - being a good example
  - stimulating us to join courses to develop competencies further
  - thinking along with us to give directions
  - challenge and motivate us

- Expectation to leader/management
  Giving flexibility and opportunities to go in certain directions on what I want to develop

C.9. Participant S5

- Responsibilities
  Responsible for health safety and the environment in continuously improving manufacturing parts
- Sustainability innovation challenges or barriers
  - the biggest challenge is the technology in manufacturing. It is not easy to monitor the amount of emission reduced when the technology is not there yet
  - the limitation of resources in the factory
  - the diverse stakeholders make it harder to achieve goals in sustainability

- Sustainability innovation
  - we try to reduce the use of water, electricity consumptions, and waste
  - we create products and packaging that require less plastic

- Sustainability competencies
  - understand technicalities and knowledge on specific parts of the job
  - the ability to simplify complex issues
  - ability to think in a broad setting
  - thinking critically
  - adaptive in fast working environment, fast learner, especially in this digital era
  - embrace diversity

- Sustainability competencies and innovation
  Possessing competencies make me able to move fast and adaptive to achieve sustainability innovation and utilizing the competencies help my day-to-day job
- Competencies needed in a team
  - a person who is able to communicate with stakeholders
  - a person who can integrate between the internal and external environment
  - a person who is able to analyze data and understand technicalities

- Things to do to develop competencies

  - continuously learning by joining the training
  - communicate with diverse people to understand their expectations and needs
  - learning by doing
  - asking people for feedback on what I need to improve

- Leader/management support
  - be a good example
  - show how they can manage the challenges
  - giving feedback, resources, and budget for training and conference
  - support for giving access to discuss the issues

C.10. Participant M5

- Responsibilities
  Responsible for reducing waste in medical equipment, especially on surgical devices. Leading from an industrial design point of view and connecting with sustainability groups, and trying to pull all knowledge to influence the company's road map and projects
- Sustainability innovation challenges or barriers
  - regulatory compliance is very strict approval we need to stick to, for example, in terms of balancing efficacy and safety with sustainability
  - technical feasibility challenge, for example, we want to have sustainable materials while also needing to be strong to pass the sterilizations process
  - components that are used most of the time are costly
- Sustainability innovation
  We focus on promoting sustainability by building a modular product based. We try to reuse the waste for material on the new products
- Sustainability competencies
  - ability to effectively communicate with customers
  - need to be knowledgeable in healthcare materials
  - ability to bring awareness to various levels of the organizations
  - connect people and show options for the solutions
  - communicate the concept in an understandable way
  - influence and convince stakeholders to adopt sustainability
  - creating connections with other people and team members
  - strong empathy when I design in the medical field by understanding customers' perspectives
  - bringing solutions that can be integrated with companies' problems
  - the ability to visualize the concept
  - spot solutions quickly by analyzing the issues
- Sustainability competencies and their influence to the team
  Enable me to convince and motivate the team to adopt sustainability through a connection creation so that they feel empowered that they can do the change as well
- Sustainability competencies and innovation
  - possessing competencies equip me to understand the problem easily and I am trained to pinpoint where the innovation opportunities are

  - assist me in communicating with customers, which enables me to understand their views about the issues and perspectives, allowing me to design the product that satisfies the stakeholders
  - bring a lot of awareness to understand sustainability

- Competencies needed in a team
  Everybody needs to possess a certain level of empathy to be able to influence and complement each other in innovating for sustainability
- Things to do to develop competencies
  - learning through reading research paper
  - having a call with a group of medical staff
  - listen to podcasts about innovation
- Leader/management support
  - provide training
  - give support when I need it
  - exchange knowledge
- Expectation to leader/management
  - the need for management to push sustainability topics across the organization
  - implementing KPI for sustainability for all projects

C.11. Participant M6

- Responsibilities
  Product management and marketing within a sustainability group
- Sustainability innovation challenges or barriers
  - sustainability topic keeps on changing
  - high regulation for the healthcare products
  - the culture and mindset of the employees
- Sustainability innovation
  The innovation starts from how we manufacture our products with the lowest amount of resources, sustainable, taking care of the waste system, lowest pollution, and does not have a bad effect on the people and environment
- Sustainability competencies
  - be curious on the new things and try to seek out what is currently up there as a standard
  - actively communicate with stakeholders
  - be open to new changes
  - effectively communicate the change so that it can be adopted by stakeholders
  - understand different perspectives, countries, and cultures
  - ability to analyze the patterns for future standards or regulations
  - ability to implement and integrate the solutions for company business
  - be able to adapt to new situations
  - the ability to explain the concepts in a simple manner for various levels of organization
  - see problems from different perspectives

- Sustainability competencies and their influence to the team
  The competencies are shown in my daily life, which create a ripple effect on my teams and create a change in delivering sustainable innovation
- Sustainability competencies and innovation
  The competencies help me in adapting to new things. It also assists me in engaging stakeholders to adopt sustainability innovation
- Things to do to develop competencies
  - doing my own research
  - reading research paper
  - having an empathy
  - having a critical mindset
- Leader/management support
  Providing a budget to develop competencies through learning or training
- Expectation to leader/management
  - sharing the sustainability terms with all of the employees
  - create a value chain related to sustainability starting from the hiring process

C.12. Participant S6

- Responsibilities
  Responsible for sustainability innovation
- Sustainability innovation challenges or barriers
  - different companies translate sustainability terms differently
  - the lack of vision shared within the organization leading to different perceptions from the employees
- Sustainability innovation
  We focus on reducing energy consumption and minimizing the amount of waste
- Sustainability competencies
  - need to stay updated and adaptive to the changes
  - be able to do the best research
  - understand and orient to know what we want to do, the aim, how to deliver the idea, the objectives
  - be aware of what kind of stakeholders might be related to the innovation
  - understand how to work on the innovative solutions
  - be able to see the ups and downs of every circumstance and every scenario
  - be open-minded and critical
  - be focused on achieving the goals
  - have empathy and sensitivities
  - strive to focus on the result in the long-term process
- Sustainability competencies and their influence to the team
  The competencies assist in forming solutions together with the team, which further shapes an influential innovation for sustainability collaboratively
- Sustainability competencies and innovation
  As sustainability is a long-term process, the competencies help me to keep searching, looking for something new continuously to be able to deliver the innovation for sustainability. The competencies help in systematically thinking and working on the problems so that efficiencies and effectiveness are achieved

- Competencies needed in a team
  - a person who understands technicalities
  - a person with policy and governance knowledge
  - have the same level of empathy within a team
- Things to do to develop competencies
  Have regular feedback meetings with the team
- Leader/management support
  - be a good example in adopting sustainability
  - have a discussion and knowledge exchange with senior management
  - share the ambitions and inspire me
- Expectation to leader/management
  - share sustainability definition across the organization
  - give training

C.13. Participant S7

- Responsibilities
  Advisor for the circular economy
- Sustainability innovation challenges or barriers
  - when driving innovation, the main challenges are to get the people with you
  - the broad stakeholders make the issue becomes broader
  - comfortable in the status quo
- Sustainability innovation
  The use of natural materials and zero carbon emission
- Sustainability competencies
  - being patient as most of the time, the transition process is very slow
  - keep your eyes on the goal
  - eager to learn
  - active listening to the issues
  - be curious and creative
  - eager to collaborate with the team
  - effectively communicate the change in a practical way and taking account all the stakeholders
  - listen carefully to each other
  - have the overview based on social and environment awareness
- Sustainability competencies and their influence to the team
  Having competencies enable me to stimulate teams by giving the best way of help and giving them space to look into a holistic view
- Sustainability competencies and innovation
  The competencies make me have critically thinking, which drives me to deliver innovative solutions. Besides, I can quickly grasp a broad picture of the problem, helping me in choosing which activities can be adopted
- Competencies needed in a team
  The more diverse team, the better
- Things to do to develop competencies

  - active listening and engaging with various stakeholders to get new knowledge and perspective
  - offer help first to the problems
  - engage heavily with social things

- Leader/management support
  - be supportive when I have new ideas
  - be flexible and give freedom
  - give a budget for training and education

- Expectation to leader/management
  Supportive on which competencies I want to develop

Codes

Table 4: Codes Assigned in Data Analyzing

Code	Theme	Participant Referenced
Complex and broad system	Sustainability challenges	M3, M2, M6, S1, S7, S3
Cost		M3, M2, M6, S4, M5
Regulations continuous change		M2, M6, S3, M5
Openness to change		M6, S1, M1
Comfortable in the status quo		S2, S7, M1
Different intrinsic motivation		S7, M1, S3
Governance of the organization		M6, S5, M1
Technical feasibility		M3, S5, M5
Sustainability terms is not shared to all employees		S6, M5
Availability of alternatives		M3, S5
Reduce, reuse, recycle	Innovation	M3, M2, S2, M6, S6, S4, S1, S5
Local community involvement		M3, M2 S2, M6, S6, S1, M5, M4
Accelerate company's mission		M3, M2, S2, S4, M1, M4
Long-term investment		S2, M6, S1, M1, M5, M4
Supplier diversity		M6, S1, S3
Workers quality of life		M6, S5, S3
Responsibility act to environment		S4
System thinking	Cognitive competencies	M3, M2, S2, M6, S6, S4, S1, S7, M1, S3, M4
Future thinking		M2, S2, M6, S6, S4, S5, S7, M1, S3, M4
Adaptibility		M2, M6, S6, S4, S1, S5, M1, S3
Technical competency		M3, S2, S4, S5, S3, M4
Decision making competency		M3, S1, S3
Emotional Empathy	Emotional competencies	M3, S2, M6, S6, S4, S1, S5, S7, M1, M5
Embracing diversity		M3, M2, S2, M6, S1, S5, S7, M1, M4
Interdisciplinary		M2, S4, M4
Interpersonal competencies	Behavioural competencies	M3, M2, S2, M6, S6, S4, S1, S5, S7, M1, M5, M4
Effective communication		M3, M2, S2, M6, S4, S1, S5, S7, S3, M5, M4
Continous learning		M3, M2, S2, M6, S6, S4, S1, S5, S7, M1, S3
Influencing competencies		M3, M6, S4, S1, M5, M4
Change oriented		S6, S4, M1
Integration competencies	Combination competencies	M3, M2, M6, S6, S4, S1, S5, M1, S3, M5, M4

Intrinsic motivation	Other competencies	M2, S2, M6, S6, S4, S5, S7, M1, M5, M4
Knowledge processing for new ideas	Cognitive and innovation cap.	M2, S2, S6, S1, S5, M5
Understand the system		S2, M6, S6, S4, S5, M1, M5
Help in managing idea		M2, S6, S5, S7, M5
Think for future innovation		S3, M4
Influencing stakeholders to adopt sustainability	Behavioral and innovation cap.	M3, M2, S2, M6, S6, S4, S1, S7, S3, M4
Think innovation from multiple perspective		M3, S4, S5, S7, S3, M5
Balance external and internal perspective		S2, M1, M4
Stimulate employees to possess competencies		S7
Understand different stakeholders	Emotional and innovation cap.	M3, M2, S2, M6, S6, S4, S1, S5, S7, M1, S3, M5, M4
Purpose driven		M3, M6, S6, S4, S7, M1, M5, M4
Build relation with others		M3, M2, S1
Motivate to do better for future		M1
Technical knowledgeable	Ideal team	S2, M6, S6, S4, S1, S5, M1, M5
Communicator		M6, S4, S1, S3, M4
Stakeholder management		S2, M6, S6, S1, M1
Continous learner		M6, M1, M4
Goal driver		S6, M1
Decision maker		M4
Training and learning	Develop competencies	M3, M2, S2, S6, S4, S1, S5, S7, M1, M4
Collaboration		S2, S6, S4, S5, S7, M5
Open to changes		M2, S1, S5, M1, M4
Sensitive to other		S1, S5, S7, M1, M5
Expose with resources and recent information		M6, S3, M5
Training	Leader/management support	S1, S5, S7, M1, M5
Be flexible and give opportunity		S4, S7, M1, M4
Be a good example and inspiration		S6, S4, S5
Provide time for discussion		S6, S1, S5
Form a strategy and platform		S3, M5, M4
Help in aligning competencies and needs		M3, S4, S3
More traning provided	Expectation to Management	M3, S4, S3, M4
Infuse sustainability in every project		S6, S5, M5
Be supportive		M2, S1
Openness to change		M1
Share sustainability terms		S6
Up to date with the trend		S3